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THE FARM GARDEN IN THE NORTH

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FARMERS' BULLETIN 937

UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the Bureau of Plant Industry

WM. A. TAYLOR, Chief

Has been rev.
--see rev.ed.
binders at
end of file.

Washington, D. C.

February, 1918

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A HALF-ACRE GARDEN, if properly cared for, will produce sufficient vegetables for the average family's use during the summer and for storing, canning, and drying for winter use.

For many vegetables which deteriorate rapidly after being gathered, the only practicable means of securing the best is to grow them at home. This is especially true of garden peas, sweet corn, string beans, Lima beans, and asparagus.

A half-acre garden, well cared for, will produce a far greater return per acre than can be realized from an equal area devoted to general farm crops.

A liberal supply of vegetables, properly prepared and well served, will be found not only nutritious and healthful but economical.

Suitable dates for planting vegetables in different sections have been determined by zones based on the average date of the last killing frost in spring and the first killing frost in autumn.

Specific directions are given for the planting, care, and cultivation of the various vegetables.

THE FARM GARDEN IN THE NORTH.

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DESIRABILITY OF A FARM GARDEN.

A HALF-ACRE GARDEN, if well planned and cared for properly, will produce far more vegetables than the average family can consume during the maturing period of the crops. Beets, late cabbage, carrots, celery, onions, parsnips, potatoes, sweet potatoes, salsify, and turnips may be grown and stored for winter use. The half acre will produce vegetables which, if purchased in the market, would exceed \$100 or even \$200 in cost. Not only is it possible to reduce the cost of the family's food materially by taking advantage of the possibilities of the home garden, but the satisfaction of having a supply of fresh vegetables near at hand, so that, regardless of market conditions, the list may be varied, is something that can not be measured in dollars and cents. Fresh vegetables from the home garden are not subjected to the deterioration which supplies purchased in the markets suffer and are not liable to become infected, either there or during transportation. Many vegetables lose their characteristic flavor when not used within a few hours after gathering, but can always be had fresh if grown at home. By means of the home garden the production of the vegetable supply for the family is directly under control, and in many cases this is the only way to secure fresh produce.

LOCATION OF THE GARDEN.

While successful gardens are grown on all kinds of soils from light sands to mucks and heavy clays, soil in good tilth and well supplied with plant food is essential to the production of a successful garden. It is often possible to select a site with soil that will yield better results with less labor than near-by plats with less favorable soils. Good soil is essential to a successful garden. If the soil on the selected garden site is poor, it must be put into good condition before satisfactory results can be expected. Even where the soil is good to start with, it will be necessary to spend considerable time in improving it by cultivation and fertilization before it is in first-class condition for the production of vegetables.

A sandy loam is an excellent type of garden soil. Sandy soils, as a rule, warm up earlier than others in the spring and enable the gardener to plant his crops early. Soils too sandy dry out very rapidly and the crops are liable to suffer from drought.

The lay of the land has considerable influence upon the time when the soil can be worked, and a gentle slope toward the south or southeast is most desirable for the production of early crops. It is an advantage to have on the north and northeast a hill, a group of trees, some evergreens, a hedge, buildings, a tight board fence, or a stone wall in order to break the force of the wind.

Good drainage of the garden area is of prime importance. If this does not exist naturally it may be supplied by tillage or by artificial drains. The surface of the land should have sufficient fall to drain off surplus water during heavy rains, but the fall should not be so great that the soil will be washed. On hillsides washing can be overcome to a considerable extent by contouring the rows so as to cause the rains to run off slowly. The garden should not contain depressions in which water will accumulate or stand. If the surface is irregular a little soil can be taken from high places and the low ones filled. Waste water from surrounding land should not flow toward the garden, and the fall below should be such that there will be no danger of flood water backing up. A garden site on the banks of a creek or stream that will be liable to overflow during the growing season should not be selected if any other can be had.

A good fence around the garden plat is almost indispensable. It should protect the crops from all farm animals, including poultry, and should be tight enough to keep out rabbits.

PROXIMITY OF THE GARDEN TO THE HOUSE.

The question of proximity to the house is of as great importance in locating the garden as the character and contour of the ground. In every case it should be as near as possible, so that the work of caring

(Amendment 5 to B. A. I. Order 212.)

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.

TO PREVENT THE SPREAD OF SCABIES IN SHEEP.

Effective on and after March 1, 1918.

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY.

The fact has been determined by the Secretary of Agriculture, and notice is hereby given, that a contagious, infectious, and communicable disease known as scabies exists among sheep in the parishes of Allen, Beauregard, and Vernon in the State of Louisiana.

Now, therefore, I, D. F. Houston, Secretary of Agriculture, under authority conferred by section 1 of the act of Congress approved March 3, 1905 (33 Stat., 1264), do hereby quarantine the parishes of Allen, Beauregard, and Vernon in the State of Louisiana, and do hereby order that sheep may be moved from the area hereinbefore quarantined to any other State only in accordance with the regulation of the Secretary of Agriculture for the prevention of the spread of scabies in sheep.

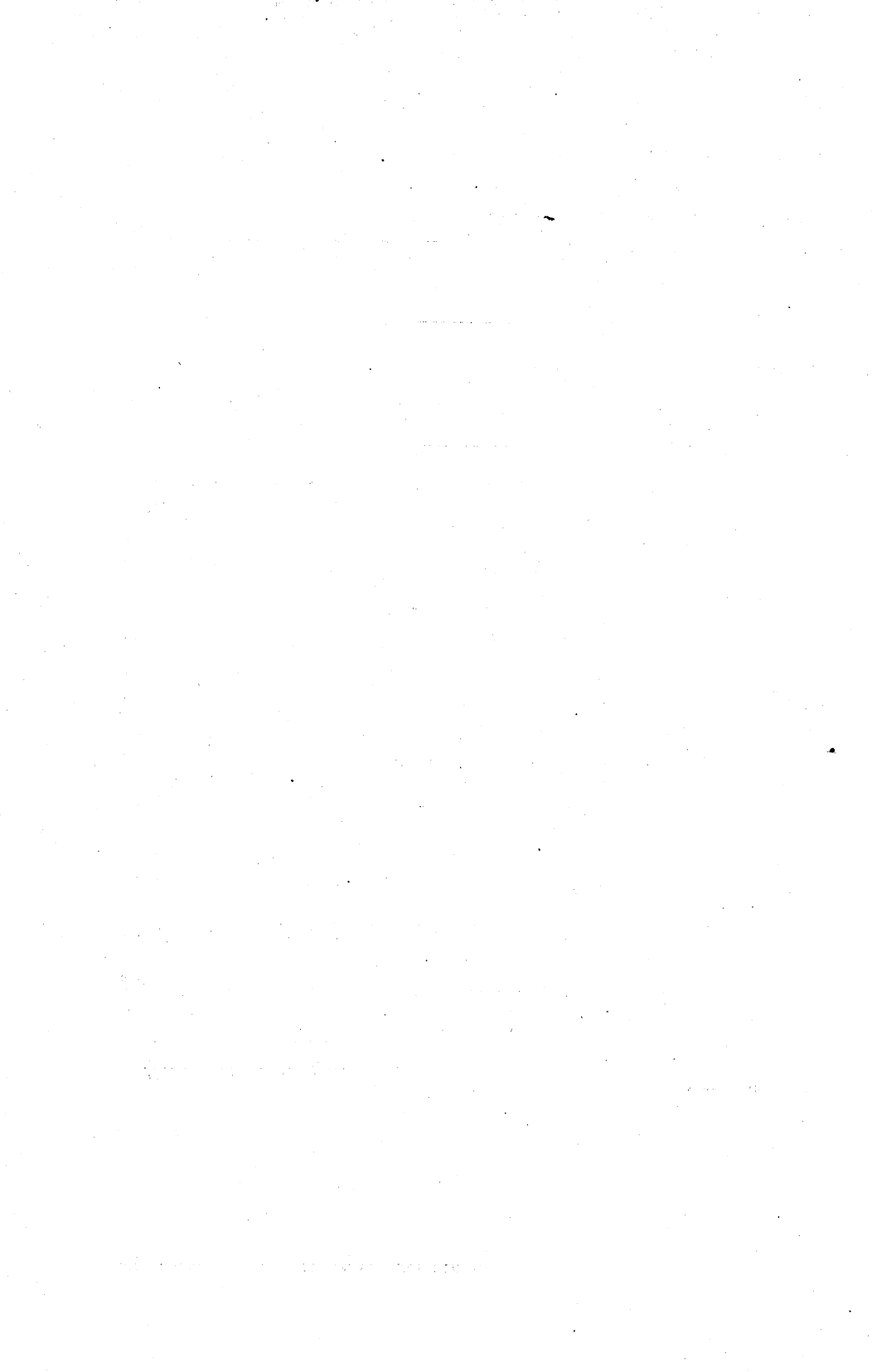
This amendment, which for the purpose of identification is designated as Amendment 5 to B. A. I. Order 212, shall be effective on and after March 1, 1918.

Done in the District of Columbia this 8th day of February, 1918.

Witness my hand and the seal of the Department of Agriculture.



D. F. HOUSTON,
Secretary of Agriculture.



for the crops may be done at odd times and the vegetables quickly secured by the housewife. (See the illustration on the title-page.) A kitchen garden located near the kitchen door is a convenience in thousands of homesteads. It is desirable even where a separate larger garden is utilized for the production of the main portion of the vegetable supply for the family.

IMPORTANCE OF SUNLIGHT.

In selecting the location for the garden and in planning the arrangement of the crops, the gardener should understand that no amount of fertilizer, watering, and care will replace sunshine. Careful consideration should be given to how many hours a day any part of the proposed garden space is shaded. As a rule, foliage crops, such as lettuce, kale, and spinach, do fairly well in partial shade, but must have a minimum of three hours of sunshine a day. Plants which ripen fruits, such as the tomato and eggplant, should have a minimum of five hours of sunshine each day.

PLAN AND ARRANGEMENT OF THE GARDEN.

It would be difficult to give a plan or specific arrangement for a garden that would suit all demands. Such a plan must be devised by each individual grower. Suggestive arrangements, however, are here presented, with the idea that they can readily be changed to suit local conditions.



FIG. 1.—When the garden is to be worked by a horse, the rows should be laid out the long way of the garden and should be straight.

NOTED	COLOR FRAME	SEED BED	1	RHUBARB	MORSE RADISH	FRENCH OR BURP ARTICHOKE	HERBS
GATE OR ENTRANCE	2			PARSNIPS	ASPARAGUS		
3						CARROTS	
4					SALSIFY AND SIMILAR LONG-SEASON CROPS		
5				BEEFS	PEPPERS	EGGPLANT	
6				LETTUCE (FOLLOWED BY CELERY)	RADISHES (FOLLOWED BY CELERY)	ONION SETS (FOLLOWED BY CELERY)	
7					EARLY BEANS (FOLLOWED BY CELERY)		
8					EARLY PEAS (FOLLOWED BY CELERY)		
9					LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIFLOR OR POTATO ONIONS)		
10					LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIFLOR OR POTATO ONIONS)		
11					LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIFLOR OR POTATO ONIONS)		
12					LATER PLANTINGS OF PEAS AND BEANS (FOLLOWED BY SPINACH AND MULTIFLOR OR POTATO ONIONS)		
13					EARLY CABBAGE (FOLLOWED BY LATE PEAS AND BEANS)		
14					EARLY CABBAGE (FOLLOWED BY LATE PEAS AND BEANS)		
15					TOMATOES (PLANTS 4 FEET APART IN ROW)		
16					TOMATOES (PLANTS 4 FEET APART IN ROW)		
17					OKRA, NEW ZEALAND SPINACH AND MISCELLANEOUS VEGETABLES		
18					MELONS	SQUASHES	
19					EARLY POTATOES (FOLLOWED BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING)		
20					EARLY POTATOES (FOLLOWED BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING)		
21					EARLY POTATOES (FOLLOWED BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING)		
22					EARLY POTATOES (FOLLOW BY LATE CORN OR CABBAGE PLANTED BETWEEN POTATOES BEFORE DIGGING)		
23					EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS)		
24					EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS)		
25					EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS)		
26					EARLY CORN (FOLLOWED BY TURNIPS OR RUTABAGAS)		
27					SWEET POTATOES, JERUSALEM ARTICHOKE OR PUMPKINS		
28					SWEET POTATOES, JERUSALEM ARTICHOKE OR PUMPKINS		
29					LIMA AND OTHER POLE BEANS		

FIG. 2.—Plan of a half-acre garden. Length, 220 feet; width, 100 feet. A half-acre garden will produce all the vegetables the average family can use throughout the growing season and a surplus for canning, storing, and drying.

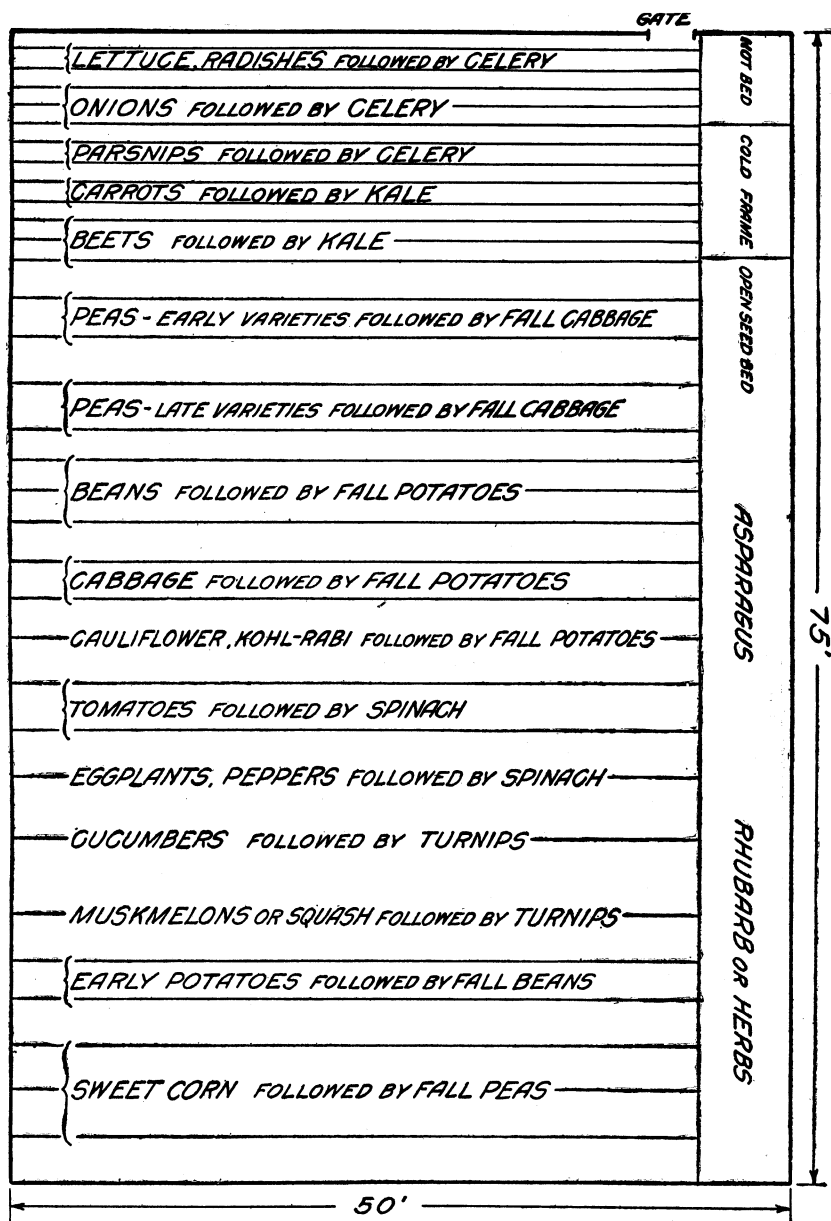


FIG. 3.—Plan of a town or city garden. Length, 75 feet; width, 50 feet. For hand cultivation, the rows may be laid out the short way of the garden and the turning spaces at the ends may be omitted.

The first consideration in planning the arrangement of a garden is the kind of cultivation that is to be employed. When the work is to be done mainly by means of horse tools the site and the arrange-

ment should be such as to give the longest possible rows, and straight lines should be followed. (Fig. 1.) The garden should be free from paths across the rows, and turning spaces should be provided at the ends. (Fig. 2.) For hand cultivation the arrangement can be quite different, as the garden may be laid off in sections, with transverse walks, and the rows for most crops may be much closer. (Fig. 3.) Horse cultivation is recommended whenever possible, as it very materially lessens the labor and cost of caring for the crops.

An important consideration is the location of permanent crops, such as asparagus and rhubarb. If any of the small fruits, such as raspberries, currants, and gooseberries, are to be planted within the garden inclosure, they should be included with the permanent crops. The area devoted to the hotbed, coldframe, and seed bed should be decided upon, but these may be shifted more or less from year to year or located in some convenient place outside of the garden.

Where there is any great variation in the composition of the soil in different parts of the garden it will be advisable to take this into consideration when arranging for the location of the various crops. If a part of the land is low and moist, such crops as celery, onions, and late cucumbers should be placed there. If part of the soil is high, warm, and dry, there is the proper location for early crops and those that need quick, warm soil.

PREPARATION OF THE SOIL.

Autumn is the time for plowing hard or stiff clay soils, as the action of the frost during the winter will break the soil into fine particles and render it suitable for planting. Sandy loams and soils that contain a large amount of humus may be plowed in the spring, but the work should be done early, in order that the soil may settle before planting. Whatever the type of soil, at least a portion of the garden should be plowed in the autumn, so that early crops may be planted as soon as possible in the spring. Plowed ground dries out quicker than unplowed, and by plowing in the fall it is possible to get such crops as peas, beets, and early potatoes planted much earlier than otherwise would be the case.

Sandy soils will bear plowing much earlier than heavy clay soils. The usual test is to squeeze together a handful, and if the soil adheres in a ball it is too wet for working. In the garden, greater depth of plowing should be practiced than for ordinary farm crops, as the roots of many of the vegetables go deeply into the soil. Subsoiling will be found advantageous in most cases, as the drainage and general movement of the soil moisture will be improved thereby.

Hand spading should be resorted to only in very small gardens or where it is desirable to prepare a small area very thoroughly.

After plowing or spading, the next step is to smooth and pulverize the soil. If the soil is well prepared before planting the work of caring for the crops will be materially lessened and better crops will be secured. It is not sufficient that the land be smooth on top, but the pulverizing process should extend as deep as the plowing. Some gardeners follow the practice of disking the soil before plowing, so that when it is turned the bottom soil will be fine and mellow. After the plow, the disk or cutting harrow is again brought into play and the pulverizing process completed. If the soil is a trifle too dry and contains lumps, it may be necessary to use some form of roller or clod crusher to put it in proper condition. For smoothing the surface and filling up depressions, a float or drag made from planks or scantlings will be found serviceable.

MANURES AND FERTILIZERS.

The soil for vegetable growing should be rich and well supplied with humus. Barnyard or stable manure is the best, because it furnishes both plant food and humus. An application of 20 to 30 tons of such manure to the acre is very satisfactory, and on some soils this application will need but little reenforcing with commercial fertilizers. The manure should be applied far enough in advance of planting time to allow it to decay. If coarse manure is used, it should be applied in the fall and turned under, but well-rotted manure should be applied after plowing and should be well mixed with the soil by harrowing.

Where manure is not available, some leguminous crop, such as cow-peas, soy beans, vetch, or crimson clover, should be turned under to supply humus and a part of the nitrogen. In addition to the humus added to the soil through the growth of these crops, the cultivation necessitated by their growth tends to make available some fertilizing elements, especially potash. The use of commercial fertilizers is advisable in many cases, but owing to the high cost of nitrogen and potash in commercial fertilizers they should be used only if necessary as a supplement to the nitrogen to be secured through the use of leguminous crops and stable manure and the potash made available in many soils by intelligent cultivation.

Phosphates are relatively inexpensive and their use is advisable in most cases. They are especially valuable in that they aid in bringing the crops to maturity. An application of 300 to 600 pounds of acid phosphate to the acre will be sufficient.

No definite rule can be given for the kind or quantity of mixed fertilizer to be applied, as this varies with the crop and soil. In most cases it is safe to apply 1,000 to 2,000 pounds of a high-grade fertilizer to the acre. One analyzing 2 to 4 per cent nitrogen, 8 per

cent phosphoric acid, and 6 to 8 per cent potash should give good results if the soil is well supplied with humus. This fertilizer may be secured already prepared or may be mixed at home. The following combination will make a satisfactory fertilizer for a home garden and may be applied at the rate of 1,000 to 2,000 pounds to the acre:

150 pounds of nitrate of soda.
650 pounds of cottonseed meal.
1,000 pounds of acid phosphate, 16 per cent.
200 pounds of muriate or sulphate of potash.

It should be borne in mind that commercial fertilizers will not produce satisfactory results unless the soil is well supplied with humus. In fact, large quantities of fertilizers are justified only where the soil is in good mechanical condition.

Owing to the scarcity and high price of both nitrogen and potash fertilizers, a very satisfactory substitute may be had by using chicken or pigeon manure, acid phosphate, and hardwood ashes. The following quantities per acre will make a satisfactory application:

3 tons of chicken or pigeon manure.
1,000 pounds of acid phosphate.
1,000 pounds of hardwood ashes.

The acid phosphate and hardwood ashes may be mixed and applied either by hand or with a fertilizer drill. The manure, however, should be applied separately, as mixing it with the other ingredients will cause a loss of nitrogen. This fertilizer should be used as suggested for the previous formula. It should be remembered, however, that this kind of manure is very strong and liable to cause injury to the plants if applied in direct contact with the roots. It should be applied and worked into the soil before the garden is planted, or, if used after planting, should be applied between the rows a few inches from the plants.

The use of lime is advisable on heavy soils, especially when green manures and cover crops are employed to add humus to the soil. Lime should not be applied at the same time as either stable manure or mixed fertilizer, as it will under those circumstances cause the loss of nitrogen.

Lime may be applied in the form of ground lime (calcium oxid), ground limestone (calcium carbonate), or air-slaked lime, which is in most cases a mixture of calcium hydroxid and calcium carbonate. Ground limestone acts slower than burned lime, but is satisfactory. When the ground freshly burned lime is applied, it should be used at half the rate of the air-slaked lime or the ground limestone. From 5 to 10 pounds of the ground limestone and half this quantity

of the ground burned lime is a sufficient application for each 100 square feet of soil.

SEEDS AND PLANTS FOR THE GARDEN.

Vegetable seeds should be ordered in advance of the time for planting in the open, so that they will be on hand in time for planting in flats or frames and also for use outdoors as soon as the weather and the condition of the soil make planting possible. Before ordering seed, it is a good idea to look over the garden plat, decide on the best location for each vegetable, and determine how much seed will be required for the space available for each variety. The garden plan may then be drawn.

Make the seed supply produce 100 per cent of efficiency. Estimate the needs carefully. Order what you need and no more. Make the best possible use of what is obtained. Wasteful practices on your part may deprive a neighbor of a needed supply.

SEED FOR A FAMILY OF FOUR.

The following are the approximate quantities of seed that should be purchased for a garden which is to supply vegetables for successive plantings throughout the season for a family of four:

Beans:		Lettuce-----	$\frac{1}{2}$ ounce.
Bush Lima-----	1 pint.	Muskmelon-----	1 ounce.
Pole Lima-----	1 pint.	Onion sets-----	4 to 6 quarts.
Snap-----	1 to 2 quarts.	Peas-----	2 to 4 quarts.
Beets-----	4 ounces.	Parsley-----	1 packet.
Cabbage:		Parsnips-----	$\frac{1}{2}$ ounce.
Early-----	1 packet.	Radish-----	1 ounce.
Late-----	$\frac{1}{2}$ ounce.	Salsify-----	1 ounce.
Carrot-----	1 ounce.	Spinach-----	$\frac{1}{2}$ pound.
Cauliflower-----	1 packet.	Squash, summer-----	1 ounce.
Celery-----	1 packet.	Tomatoes:	
Corn, sweet-----	1 to 2 pints.	Early-----	1 packet.
Cucumbers-----	1 ounce.	Late-----	$\frac{1}{4}$ ounce.
Eggplant-----	1 packet.	Turnips-----	2 to 3 ounces.
Kale-----	2 ounces.	Watermelon-----	2 ounces.

The quantity of seed specified should produce sufficient vegetables to supply the needs of the family during the growing season, as well as to supply a surplus for canning, drying, and storage.

The entire supply of seeds of string beans, bush Lima beans, sweet corn, lettuce, peas, and radish should not be planted at one time, but successive plantings, 10 days to two or three weeks apart, should be made, so that a fresh supply of vegetables may be had through the season.

AIDS TO EARLINESS.

The hotbed, the "flat" or seed box, and the coldframe are the gardener's greatest aids in raising early crops. The hotbed and the

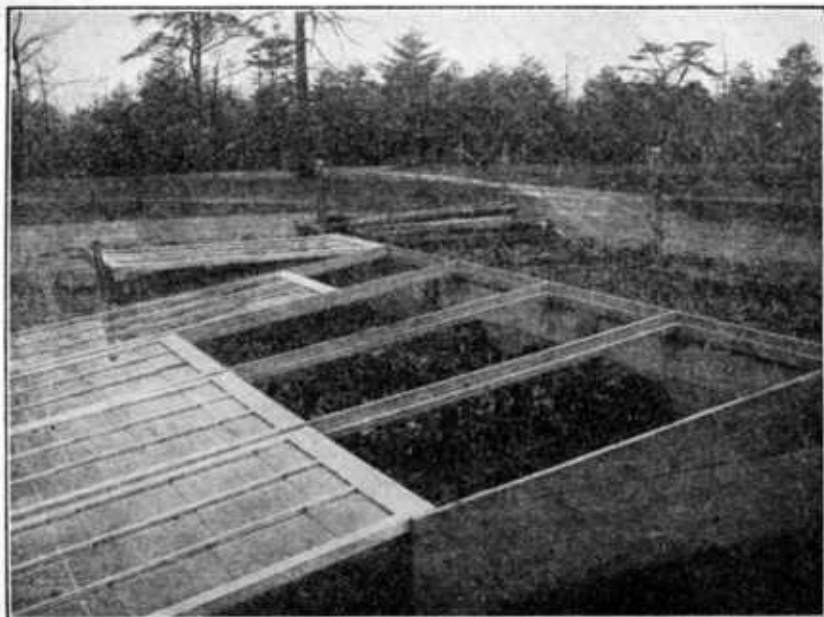


FIG. 4.—A good type of hotbed suitable for a home garden. The frame is of 1-inch boards and the sash are 3 feet wide and 6 feet long. A slope of 6 inches is sufficient to cause the water to run off.

flat enable him to plant seed and produce seedlings long before most of the seeds can be planted out of doors and before those which have been so planted have begun to germinate.

EARLY PLANTS IN HOTBEDS.

The common method of starting early plants in the North is by means of a hotbed. The hotbed consists of an inclosure covered with sash and supplied with some form of heat, usually fermenting stable manure, to keep the plants warm and in a growing condition.

An inexpensive type of hotbed is shown in figure 4. As a rule the hotbed should not be placed within the garden inclosure, but near some frequently used path or building, where it can receive attention without interfering with other work. The hotbed should always face the south, and the south side of a dwelling, barn, tight board fence, hedge, or anything affording similar protection will furnish a good location.

In the North the hotbed should be started in February or early in March, in order that the plants may be well grown in time to plant in the open ground. In planning the hotbed, provision should be made for starting early cabbage, tomato, pepper, eggplant, lettuce, sweet potatoes, onions, and, if so desired, Lima beans, cucumbers, squash, and melons, in baskets, on sods, or in dirt bands. There are

two or three forms of hotbeds that are worthy of description, and the plans may be modified to suit local conditions.

A temporary hotbed, such as would ordinarily be employed on the farm, is easily constructed by the use of manure from the horse stable as a means of furnishing the heat. Select a well-drained location, where the bed will be sheltered, shake out the manure into a broad, flat heap, and thoroughly compact it by trampling. The manure heap should be 8 or 9 feet wide, 18 to 24 inches deep when compacted, and may be of any desired length, according to the number of sash to be employed. The manure for hotbed purposes should contain sufficient litter, such as leaves or straw, to prevent its packing soggy, and should spring slightly when trodden upon.

After the manure has been properly trampled and leveled, the frames to support the sash are placed in position, facing toward the south. These frames are generally made to carry four standard hotbed sash, and the front board should be 4 to 6 inches lower than the back, in order that water will drain from the glass. From 3 to 5 inches of good garden loam or specially prepared soil is spread evenly over the area inclosed by the frame, the sash is put on, and the bed allowed to heat. At first, the temperature of the bed will run quite high, but no seeds should be planted until the soil temperature falls to 80° F., which will be in about three days.

Hotbeds having more or less permanence may be so constructed as to be heated either with fermenting manure, a stove, a brick flue, or by means of radiating pipes supplied with steam or hot water from a heating plant. For a permanent bed in which fermenting manure is to supply the heat, a pit 24 to 30 inches in depth should be provided. The sides and ends of the pit may be supported by brick walls or by a lining of 2-inch plank held in place by stakes.

Standard hotbed sash are 3 by 6 feet in size, and are usually constructed of white pine or cypress. As a rule, hotbed sash are on sale by seedsmen and dealers in garden supplies and can be purchased more cheaply than they can be made locally. In the colder parts of the country, in addition to glazed sash, either board shutters, straw mats, burlap, or old carpet will be required as a covering during cold nights. It is also desirable to have a supply of straw or loose manure on hand, to throw over the bed in case of extremely cold weather.

During bright days the hotbed will heat very quickly from the sunshine on the glass, and it will be necessary to ventilate during the early morning by slightly raising the sash on the side opposite from the wind. Care should be taken in ventilating to protect the plants from a draft of cold air. Toward evening the sash should be closed, in order that the bed may become sufficiently warm before nightfall.

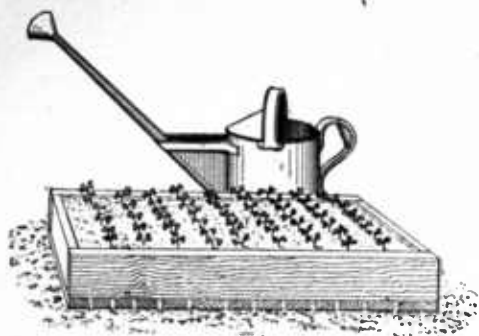


FIG. 5.

Hotbeds should be watered on bright days and in the morning only. Watering in the evening or on cloudy days will have a tendency to chill the bed and increase the danger from freezing. After watering, the bed should be well ventilated, in order to dry the foliage of the plants and the surface of the soil to prevent the

plants being lost by damping-off or mildew.

EARLY PLANTS IN COLDFRAMES.

Coldframes are constructed like temporary hotbeds except that no manure or other heating material is provided. Coldframes are covered with ordinary hotbed sash, or cotton cloth may be substituted for the sash. In the colder sections of the North, the coldframe is used for hardening off the plants that have been started in the hotbed, preparatory to setting them in the garden. In parts of zones D and E the coldframe is used for growing winter lettuce, spinach, etc. The same methods of handling recommended for a hotbed should apply to a coldframe, and thorough ventilation should be maintained.

THE SEED BED.

It is a good practice to reserve a small corner of the garden for a seed bed. Here, through special preparation of the soil it is possible



FIG. 6.—A hill of beans started in a berry box in the house long before the seeds could be planted in the open ground.

to produce better plants than could otherwise be secured. The gardener can transplant from the seed bed to the garden, thus making the plants more stocky. The location of an outdoor seed bed should be such that it may be conveniently reached for watering, and it should be naturally protected from drying winds.

Good soil for a seed bed consists of one part of well-rotted manure, two parts of good garden loam or rotted sods, and one part of sharp, fine sand. The manure should be thoroughly rotted, but it should not have been exposed to the weather and the strength leached out of it. The addition of leaf mold or peat will tend to make the soil better adapted for seed-bed purposes. Mix all the ingredients together in a heap, stirring well with a shovel, after which the soil should be sifted and placed in boxes or in the bed ready for sowing the seed.

SEED SOWING.

Garden seeds should always be sown in straight rows regardless of where the planting is made. If a flat (fig. 5) or a window box is employed for starting early plants in a dwelling, the soil should be well firmed and then laid off in straight rows about 2 inches apart. The same method holds good for planting seeds in a hotbed, cold-frame, or bed in the garden, except that the rows should be farther apart than in the window box. By planting in straight rows the seedlings will be more uniform in size and shape, and thinning and cultivating will be more easily accomplished. In all cases where the soil of the seed bed is not too wet, it should be well firmed or pressed down before laying off and marking for sowing the seeds. After the seeds are sown and covered, the surface should again be firmed by means of a smooth board. Lima beans, melons, cucumbers, and other garden crops may be started in berry baskets, on sod, or in paper bands indoors and the whole transferred to the garden when the weather permits, thus gaining considerable time. (Fig. 6.) Thirty to fifty hills of extra-early potatoes may even be had by starting as many seed pieces in a box in the living room or in a hotbed and subsequently handling the plants the same as tomato plants.

DEPTH OF PLANTING AND DISTANCE APART.

No general rule can be given with regard to depth of planting, as different kinds of vegetables and different soils necessitate different practices. The smaller the seeds the shallower the covering should be. In heavy soils the covering should be lighter than in light soils. The following table gives the depth of planting of the various vegetable seeds, as well as the quantity of seeds or number of plants

required for 100 feet of row and the distance apart for the rows and the plants in the rows.

GARDENERS' PLANTING TABLE.

Quantity of seeds and number of plants required for 100 feet of row, depths of planting, and distances apart for rows and plants.

Kind of vegetable.	Required for 100 feet of row.		Depth for planting seed.	Distance apart.		
	Seed.	Plants.		Rows.		Plants in the row.
				Horse cultivation.	Hand cultivation.	
Asparagus.	1 ounce.....	60 to 80	<i>Inches.</i> 1 to 1½	<i>Feet.</i> 3 to 4	2 feet.....	15 inches.
Bean:						
Bush.....	1 pint.....		1½ to 2	2½ to 3	2 feet.....	3 to 4 inches.
Bush Lima.....	½ to 1 pint.....		1½ to 2	3	2½ feet.....	6 to 10 inches.
Pole Lima.....	1 pint.....		1½ to 2	3	3 feet.....	3 to 4 feet.
Beet.....	2 ounces.....		1 to 1½	2 to 2½	15 to 18 inches.	4 to 5 inches.
Cabbage.....	½ ounce.....	65 to 90	2½ to 3	2 to 2½	2 to 2½ feet.....	14 to 18 inches.
Carrot.....	1 ounce.....		2 to 2½	2 to 2½	15 to 18 inches.	3 to 4 inches.
Cauliflower.....	1 ounce.....	60 to 75	2½ to 3	2 to 2½	2 to 2½ feet.....	15 to 18 inches.
Celery.....	do.....	200 to 250	3 to 4	3 to 4	18 to 24 inches.	4 to 6 inches.
Collard.....	½ ounce.....	65 to 100	2 to 2½	2 to 2½	do.....	12 to 18 inches.
Corn, sweet.....	½ pint.....		2	3 to 3½	2½ to 3 feet.....	10 to 12 inches.
Cucumber.....	1 ounce.....		1 to 1½	4 to 5	4 to 5 feet.....	15 inches.
Eggplant.....	1 ounce.....	50 to 70	½ to 1	3	2 to 2½ feet.....	18 to 24 inches.
Kale.....	½ ounce.....		½ to 1	2½ to 3	18 to 24 inches.	8 to 10 inches.
Lettuce.....	do.....	125 to 200	½ to 1	2 to 2½	15 to 18 inches.	6 to 10 inches.
Melon:						
Muskmelon.....	do.....		1 to 1½	5 to 6	5 to 6 feet.....	(Drills, 18 inches. Hills, 5 feet.
Watermelon.....	1 ounce.....		1 to 2	8 to 10	8 to 10 feet.....	(Drills, 2 to 3 feet. Hills, 8 feet.
Okra.....	2 ounces.....		1 to 2	4	3 feet.....	2 feet.
Onions:						
Seed.....	1 ounce.....		½ to 1	2	15 inches.....	3 to 4 inches.
Sets.....	1 quart.....		1 to 2	2	do.....	Do.
Parsley.....	½ ounce.....		½ to 1	2	do.....	Do.
Parsnips.....	½ ounce.....		½ to 1	2 to 2½	15 to 18 inches.	Do.
Pea.....	1 to 2 pints.....		2 to 3	3 to 4	2½ to 3 feet.....	1 inch.
Potato:						
Irish.....	5 to 6 pounds.....		4	2½ to 3	2 to 2½ feet.....	12 to 18 inches.
Sweet.....	3 pounds.....	75 (slips).	2 to 3	4 to 5	4 to 5 feet.....	14 to 18 inches.
Radish.....	1 ounce.....		½ to 1	2	12 to 15 inches.	1 inch.
Salsify.....	do.....		½ to 1	2	15 to 18 inches.	Do.
Spinach.....	do.....		1 to 2	2	do.....	1 to 2 inches.
Squash:						
Bush.....	½ ounce.....		1 to 2	3 to 4	3 to 4 feet.....	(Drills, 15 to 18 inches. Hills, 4 feet.
Vine.....	do.....		1 to 2	7 to 10	7 to 10 feet.....	(Drills, 2 to 3 feet. Hills, 8 feet.
Tomato.....	½ ounce.....	35 to 50	½ to 1	3 to 4	2 to 3 feet.....	2 to 3 feet.
Turnip.....	½ ounce.....		½ to 1	2	15 to 18 inches.	2 to 3 inches.

The seed bed should never be allowed to become dry, but great care should be taken that too much water is not applied. Plants require the action of air upon their roots, and an excess of water in the soil will exclude the air. Too frequent and heavy waterings will cause the damping-off of the seedlings.

TRANSPLANTING.

For the best results, plants started in boxes, hotbeds, or coldframes should be transplanted when they reach a height of 1 to 2 inches. Transplanting tends to produce uniform stocky plants with a well-

developed root system. The seedlings may be transplanted to boxes or to the hotbed or coldframe, to stand about 2 inches apart each way. Some growers transplant twice before setting in the open ground. Figure 7 shows two celery plants from the same seedling. The one at the left was transplanted, while that at the right was allowed to remain in the seed bed until time for planting in the garden.

HARDENING OFF.

Plants grown in a house, hotbed, or coldframe should be hardened off before they are transplanted to the garden. This can be accomplished by ventilation and exposure to outdoor conditions during the day in good weather. If the plants are in a hotbed or coldframe, the covers may be removed during the day when the weather is good and replaced toward nightfall. After danger of frosts is past the covers may be left off at night. By the time the plants are large enough to be transplanted to the garden, they should be thoroughly accustomed to outdoor conditions. Such plants usually withstand the transfer to the garden with little check and few losses.

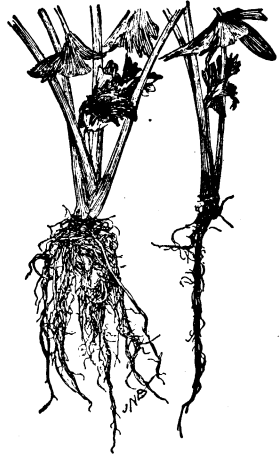


FIG. 7.—Two celery plants; one transplanted, the other from the original seed bed.

SETTING PLANTS IN THE OPEN GROUND.

Before plants are taken for transplanting, the bed should be thoroughly watered and the water allowed to soak into the ground. This will insure a portion of the soil adhering to the roots and will prevent serious wilting or the checking of growth. Take up the plants with a trowel or spade and pack them in the boxes or baskets in which they are to be carried in the field.

The land should be in good condition and everything should be ready for quick operation when planting time arrives. Mark off the rows or dig holes for the plants just before planting, in order to prevent the drying of the soil. If possible, set the plants on a cloudy day or just before nightfall. When the soil is very dry it is advisable to use a little water in the holes. The water should be applied when the hole is partly filled with soil, and the moist earth should then be covered with dry soil, to prevent baking.

TIME OF PLANTING.

Garden crops may be divided into four groups, the first including those crops that may be planted before the date of the last killing

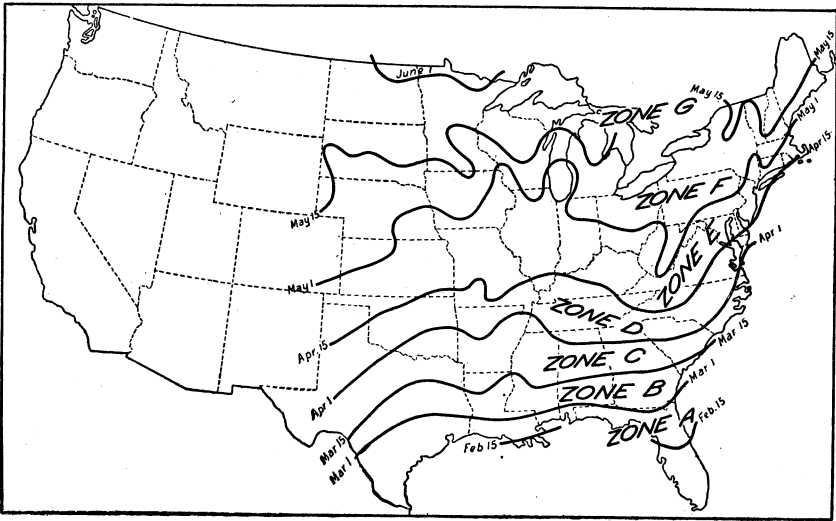


FIG. 8.—A zone map of the United States, based on the average dates of the latest killing frost in spring.

frost in the spring, the second group those that may be planted about the time of the last killing frost, the third including those crops that can not be planted until all danger of frost is past and the ground has warmed up somewhat, and the fourth, heat-loving plants that can not be planted until the weather is hot.

PLANTING ZONES FOR THE EASTERN UNITED STATES.

Most gardeners are interested in knowing the earliest date for planting the various crops, as earliness is much desired. It has been found that the earliest safe dates for planting garden crops can be determined from the average dates of the last killing frost in spring. The map (fig. 8) shows the continental portion of the United States divided into zones, with a difference of about two weeks in the average date of the last killing frost. The average dates of the last killing frost furnish a guide in planting which is reasonably safe, though it can not be depended upon every year. There is a difference of several days within the zones themselves, owing to differences in elevation, in latitude, and in proximity to bodies of water. The table gives the planting dates for the four zones comprising that portion of the United States covered by this bulletin.

TIME OF PLANTING VEGETABLE SEEDS.

Earliest safe dates for planting vegetable seeds in the open in the zones of the United States illustrated in figure 8.

Crop.	Zone D.	Zone E.	Zone F.	Zone G.
Asparagus.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1...	May 1 to 15.....	May 1 to June 1.
Artichoke:				
Globe.....	Apr. 15 to May 15..	May 1 to 30.....	(Not grown).....	(Not grown.)
Jerusalem.....	Mar. 15 to Apr. 1..	Apr. 1 to 15.....	do.....	Do.
Beans:				
Snap.....	Apr. 1 to May 1...	May 1 to 15.....	May 15 to June 1..	May 15 to June 15.
Lima.....	May 1 to 15.....	May 15 to June 1..	May 15 to June 15.	May 15 to June 15.
Beets.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.....	May 15 to June 1.
Brussels sprouts.....	do.....	do.....	do.....	Do.
Broccoli.....	do.....	do.....	do.....	Do.
Cabbage.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to May 15.
Carrots.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.....	May 1 to June 1.
Cauliflower.....	do.....	do.....	do.....	Do.
Celery.....	do.....	do.....	do.....	Do.
Chard.....	do.....	do.....	do.....	Do.
Collards.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	do.....	Do.
Corn, sweet.....	Apr. 1 to May 1..	Apr. 15 to May 15.	May 1 to June 1..	May 15 to June 15.
Cucumbers.....	Apr. 15 to May 1..	May 1 to June 1..	May 15 to June 15.	June 1 to 15.
Eggplant.....	do.....	do.....	do.....	(Season too short.)
Garlic.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.
Kale.....	do.....	do.....	do.....	Do.
Kohl-rabi.....	Mar. 15 to Apr. 1..	Apr. 1 to May 1..	May 1 to 15.....	May 15 to June 1.
Lettuce:				
Head.....	Mar. 15 to Apr. 15.	do.....	do.....	Do.
Leaf.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.
Melons.....	Apr. 15 to May 1..	May 1 to June 1..	June 1 to 15.....	do.....
Mustard.....	Mar. 15 to Apr. 1..	Apr. 1 to May 1..	May 1 to 15.....	May 15 to June 1.
Okra, or gumbo.....	Apr. 15 to May 1..	May 1 to 15.....	May 15 to June 1..	June 1 to 15.
Onion:				
Sets.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.
Seeds.....	Mar. 15 to Apr. 1..	Apr. 1 to May 1..	May 1 to 15.....	May 15 to June 1.
Parsley.....	do.....	do.....	do.....	Do.
Parsnip.....	do.....	do.....	do.....	Do.
Peas:				
Smooth.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to June 1.
Wrinkled.....	Mar. 15 to Apr. 1..	Apr. 1 to May 1..	May 1 to 15.....	May 15 to June 1.
Peppers.....	Apr. 15 to May 1..	May 1 to June 1..	June 1 to 15.....	do.....
Potatoes:				
Irish.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to June 1.
Sweet.....	Apr. 15 to May 1..	May 1 to June 1..	June 1 to 15.....	do.....
Pumpkins.....	do.....	do.....	do.....	do.....
Radish.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.
Rhubarb.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.....	May 15 to June 1.
Salsify.....	do.....	do.....	do.....	Do.
Spinach.....	do.....	do.....	do.....	Do.
Squash.....	Apr. 15 to May 1..	May 1 to June 1..	June 1 to 15.....	do.....
Tomatoes.....	Apr. 15 to May 1..	May 1 to June 1..	May 15 to June 15.	June 1 to 15.
Turnips.....	Mar. 1 to 15.....	Mar. 15 to Apr. 15.	Apr. 15 to May 1..	May 1 to 15.

In parts of zone D cabbage, turnips, spinach, and kale will withstand the winter and may be planted in the fall. With protective covering these same crops may be carried through the winter in portions of zone E. Several of the crops listed can not be grown in portions of zones F and G, as the season is either too short or the average temperature too low for the successful development of the crops, this being particularly true of eggplants, sweet potatoes, sweet corn, and melons.

The dates given in the table refer to first plantings. Several plantings should be made of crops that mature in a short time or which are in their prime only a short while. This is especially true of lettuce, radishes, string beans, and peas. Plantings of these should be made at intervals of two or three weeks until the weather becomes too hot or there is no longer time for their development before killing frosts.

PLANTING GUIDE FOR THE WESTERN UNITED STATES.

It is impossible to continue the zone lines west of the Great Plains region, owing to the fact that the western portion of the United States is so broken by rivers and mountain ranges that the average dates of killing frosts vary several weeks within a few miles. In southern California frost occurs at rare intervals, while in northern California frost is liable to occur in any month of the year. The accompanying outline map of the western part of the United States (fig. 9) gives the average dates of the last killing frost in spring, and from this information it is possible to form an idea as to the proper planting time for each crop.

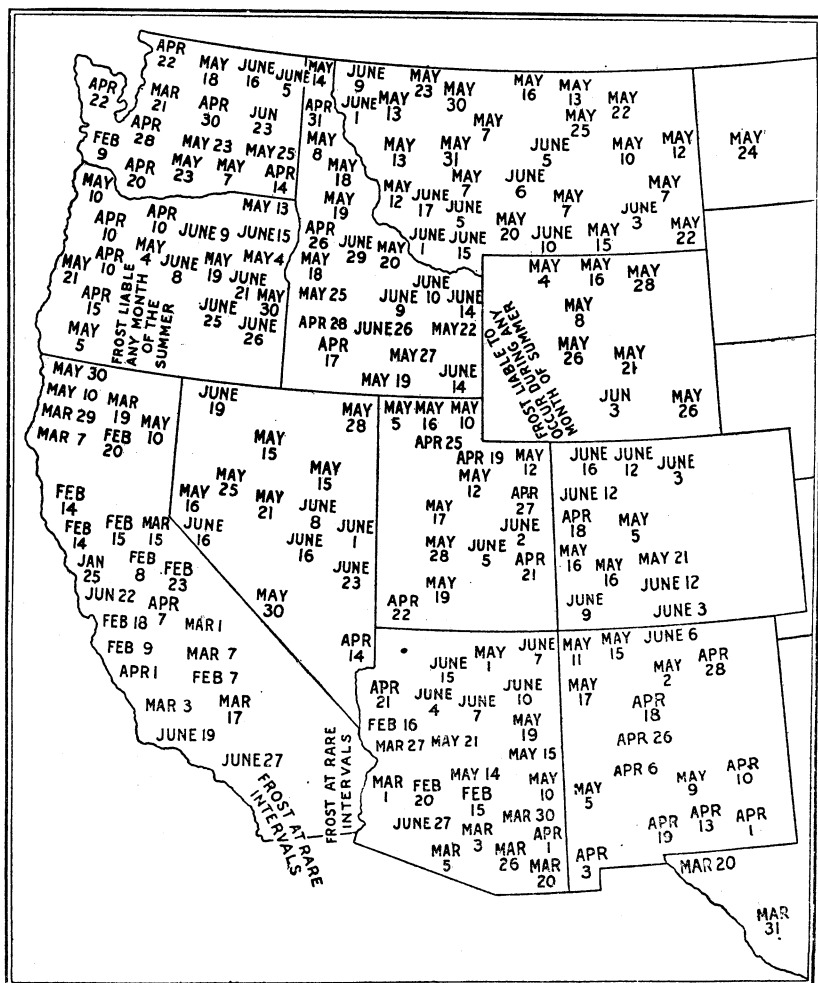


Fig. 9.—Outline map showing the average date of the last killing frost in spring in the western portion of the United States.

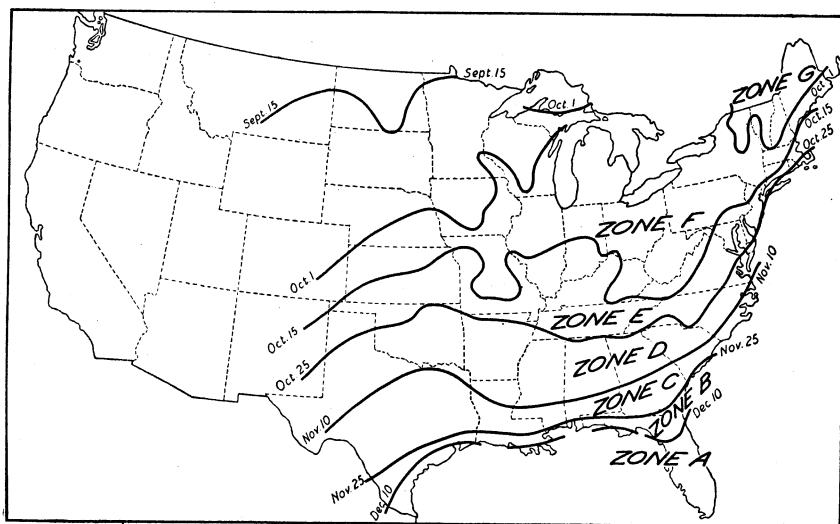


FIG. 10.—A zone map of the United States, based on the average date of the first killing frost in autumn. By referring to the table, the latest safe date for planting any crop in any one of the various zones may be determined.

Beets, early cabbage plants, cauliflower, kale, onion sets, smooth peas, Irish potatoes, and radishes may be planted two weeks before the average date of the last killing frost.

Carrots, lettuce, onion seed, wrinkled peas, spinach, and sweet corn may be planted about the date of the last killing frost.

Beans, salsify, and tomato plants may be planted two weeks after the last killing frost, while the heat-loving plants, such as peppers, eggplants, Lima beans, and squash should not be planted in the open until the ground has warmed up, which will be about four weeks after the last killing frost.

LATEST DATES FOR PLANTING VEGETABLES.

It is advisable to make successive plantings of many crops until they will not have time to mature before killing frosts. The latest safe dates for crops that may be planted in summer so that they will have time to mature before killing frosts is shown on the map (fig. 10) and table (p. 23). Many crops may be planted at frequent intervals throughout the summer until they will no longer have time to mature, as shown by the table and map mentioned. Several crops may be planted later than the dates given but will not mature before winter. Spinach and kale are frequently sown in the fall for spring use.

The dates given allow the crops time to mature and are not necessarily the latest dates for planting several of the crops. Where maturity is not necessary or desired, later plantings may be made. The map (fig. 10) is based on the average dates of the first killing frost in autumn and divides the continental portion of the United

States into zones somewhat different from those employed in the map for the earliest safe dates for planting in the spring. The table (p. 23) shows the latest date on which it is safe to plant the various crops in the different zones so that the crops will have time to mature before killing frosts. In the case of several crops not injured by moderate frost, the dates given do not always permit the crops to mature before frost. In many places it is the custom to plant fall crops for spring use. Among these may be mentioned spinach, kale, and cabbage. The purpose of the map is merely to indicate whether it is possible at a given time to mature certain crops before frost or not.

For the section of the United States west of that included in the zones, figure 11, showing the average dates of the first killing frost

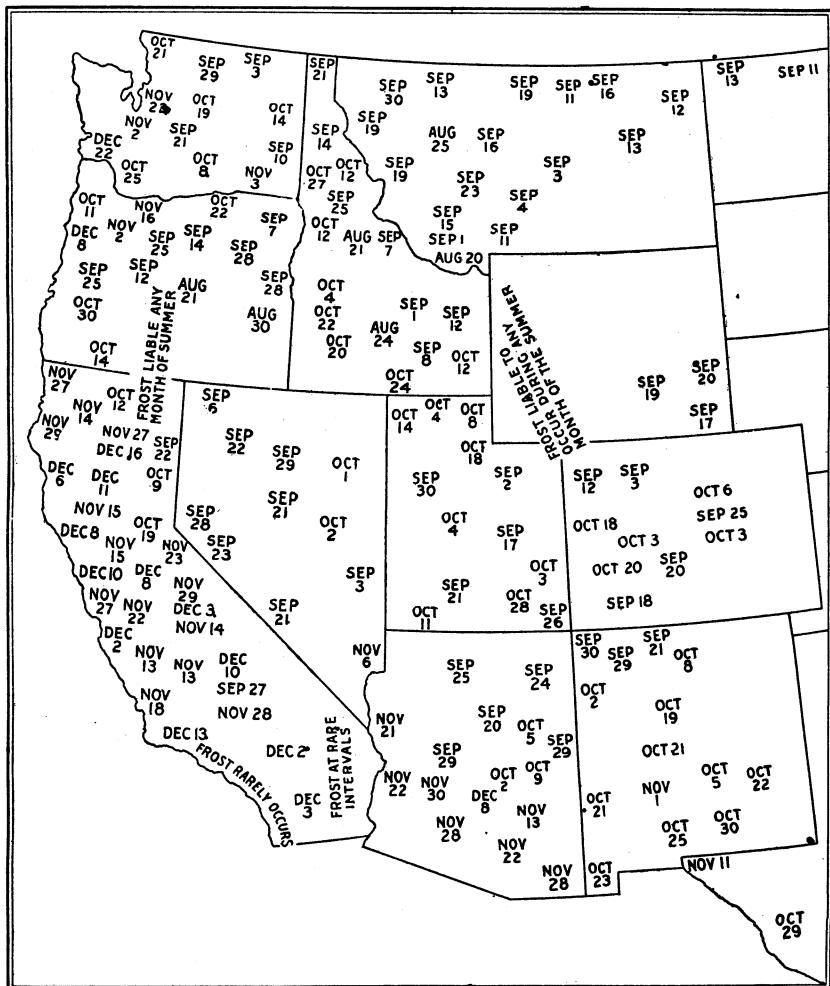


FIG. 11.—Outline map showing the average date of the first killing frost in autumn in the western portion of the United States.

in autumn, is given. The following table shows the approximate period necessary for the maturity of the various garden crops. By counting back, it can be determined whether at any time in the summer there is still time to mature a certain crop or whether the growing season is long enough for that particular crop. Due attention should be paid to the point brought out in a previous paragraph that in many places where the season is apparently long enough for certain crops, they can not be brought to maturity, owing to the fact that the average temperature is too low for their development. This is especially true of eggplants, sweet corn, sweet potatoes, and melons.

TIME OF PLANTING VEGETABLE SEEDS.

Latest safe dates for planting vegetable seeds in the open in the North, based on the average date of the first killing frost.

Crop.	Zone D.	Zone E.	Zone F.	Zone G.	Period necessary for maturity.
Bean:					
Bush.....	Sept. 1	Aug. 15	Aug. 1	July 15	40 to 65 days.
Bush Lima.....	Aug. 15	Aug. 1	July 15	.....	70 to 90 days.
Pole Lima.....	Aug. 1	July 15	July 1	.....	80 to 120 days.
Beets	Sept. 1	Aug. 15	Aug. 1	July 15	60 to 80 days.
Cabbage, late.....	Aug. 15	July 15	July 1	June 15	90 to 130 days.
Carrot.....	.....	.....	.....	.....	70 to 100 days.
Cauliflower.....	.....	.....	.....	.....	100 to 130 days.
Celery.....	Sept. 1	Aug. 1	July 1	May 15	120 to 150 days.
Collard.....	.....	.....	.....	.....	100 to 120 days.
Corn, sweet.....	Aug. 1	July 15	July 1	June 15	60 to 100 days.
Cucumber.....	.....	.....	.....	.....	60 to 80 days.
Eggplant.....	July 1	June 15	June 1	.....	100 to 140 days.
Kale.....	Oct. 1	Sept. 15	Sept. 1	Aug. 15	90 to 120 days.
Lettuce.....	Oct. 15	Oct. 1	Sept. 15	Sept. 1	60 to 90 days.
Melon:					
Muskmelon.....	June 1	May 15	May 1	.....	120 to 150 days.
Watermelon.....	July 1	June 15	.....	.....	100 to 120 days.
Okra.....	.....	.....	June 1	.....	90 to 140 days.
Onion:					
Seed.....	June 1	May 15	May 1	Apr. 15	130 to 150 days.
Sets.....	July 1	June 15	June 1	May 15	60 to 120 days.
Parsley.....	Oct. 1	Sept. 1	Aug. 1	July 1	90 to 120 days.
Parsnips.....	.....	May 15	May 1	Apr. 15	125 to 160 days.
Peas.....	Oct. 1	Sept. 1	Aug. 1	July 15	40 to 80 days.
Pepper.....	July 1	June 15	June 1	.....	100 to 140 days.
Pumpkin.....	.....	.....	.....	.....	Do.
Potato:					
Irish.....	Aug. 1	July 15	July 1	June 15	80 to 140 days.
Sweet.....	July 15	June 15	May 1	.....	140 to 160 days.
Radish.....	Oct. 1	Sept. 15	Sept. 1	Aug. 15	20 to 140 days.
Salsify.....	June 1	May 15	May 1	Apr. 15	120 to 180 days.
Spinach.....	Oct. 1	Sept. 1	Aug. 15	Aug. 1	30 to 60 days.
Squash:					
Bush.....	Aug. 1	July 15	July 1	June 15	60 to 80 days.
Vine.....	July 1	June 15	June 1	.....	120 to 160 days.
Tomato.....	July 15	July 1	June 15	.....	80 to 125 days.
Turnip.....	Oct. 1	Sept. 1	Aug. 1	July 15	60 to 80 days.

SUCCESSION AND ROTATION OF CROPS IN THE GARDEN.

All the ground in the garden should be kept fully occupied all the season. As soon as one crop is removed, something else should take its place. The following grouping of vegetables will serve to indicate which ones may precede or follow others.

Crops occupying the ground all the season.

Beans, pole.	Melons.	Pumpkins.	Tomatoes.
Beans, pole Lima.	Okra.	Peppers.	Squash.
Cucumbers.	Onions, from seed.	Potatoes, Irish,	Potatoes, sweet.
Eggplant.	Parsnips.	main crop.	

Early crops which may be followed by others.

Beans, bush.	Carrots.	Peas.	Spinach.
Beets.	Corn, early.	Potatoes, early.	Turnips.
Cabbage, early.	Lettuce.	Radish.	

Late crops which may follow others.

Beets.	Cauliflower.	Kale.	Turnips.
Brussels sprouts.	Celery.	Peas.	
Cabbage, late.	Corn, sweet.	Spinach.	

In planning the garden all early-maturing crops should be grouped together, so that after removal the ground will be available as a unit for planting something else. It is not always necessary to wait until the crop is removed. Late cabbage or sweet corn may be planted between the rows of early potatoes some two or three weeks before the potatoes are harvested. Some dissimilar crop should follow the first crop occupying the ground, in order to help in the control of insects and diseases.

CULTIVATION OF GARDEN CROPS.

Frequent shallow cultivation should be given garden crops. By keeping the surface of the soil stirred a dust mulch is formed, which prevents the loss of moisture through the pores in the soil and keeps down the weeds.

The soil should be cultivated as soon as it is dry enough after a rain to break the crust and prevent baking. Sandy soils may be cultivated when quite wet, but clay soils should not be stirred when sticky. Too much emphasis can not be placed on the matter of thorough cultivation. If the work is properly done at the right time there will be little difficulty in controlling weeds.

In cultivating the garden, small-tooth cultivators should be used to prevent ridging or furrowing.

Figure 12 shows a good type of horse cultivator for use in the garden. A turn-

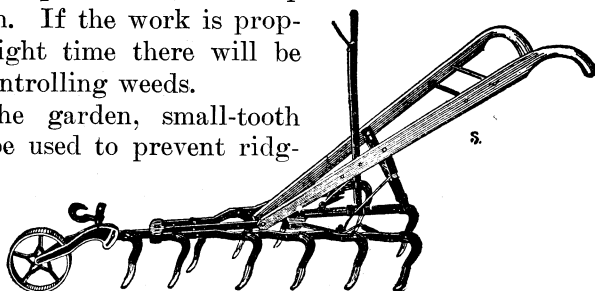


FIG. 12.—A good type of horse cultivator, well suited to garden use.

plow or sweep should not be used for cultivation unless the land becomes so weedy that a cultivator will not do the work. Frequent cultivations

kill the weeds between the rows before they become large, but handwork will be necessary to keep the soil stirred between the plants and to keep down weeds in the row. A collection of useful hand tools is shown in figure 13.



FIG. 13.—Small hand tools for the garden. From left to right they are a hand weeder, a dibble, an onion hoe, a trowel, and a scratch or claw weeder.

In addition to the horse-drawn implements found on most farms, the following tools are desirable aids in the task of laying out and caring for a garden: A tapeline 50 or 100 feet long, two iron stakes, a heavy line long enough to reach the full length of the rows (a clothesline is excellent for this purpose), a wheelbarrow, a spade, a spading fork, a hoe, a garden rake, a trowel, and a 4-prong or 5-prong potato hoe. To the above list may profitably be added a scratch weeder, a pointed hoe, and special tools for which the individual gardener has a preference.

The hand cultivator shown in figure 14 should be included in the equipment of every gardener. This implement is fitted for using a variety of attachments, enabling the gardener to do many kinds of work with it.



FIG. 14.—A small hand cultivator; a desirable addition to the garden equipment.

IRRIGATION OF GARDEN CROPS.

Throughout that portion of the country where rains occur during the growing season it should not be necessary to irrigate in order to produce the ordinary garden crops. In arid

regions where irrigation must be depended upon for the production of crops, the system best adapted for use in that particular locality

should be employed in the garden. Wherever irrigation is practiced the water should not be applied until needed, and then the soil should be thoroughly soaked. After irrigation, the land should be cultivated as soon as the surface becomes sufficiently dry, and no more water should be applied until the plants begin to show the need of additional moisture. Constant or excessive watering is very detrimental in every case. Apply the water at any time of the day that is most convenient and when the plants require it.

By the subirrigation method of watering, lines of farm draintiles or perforated pipes are laid on a level a few inches below the surface of the soil. This system is especially adapted for use in back-yard gardens where city water is available and the area under cultivation is small. Subirrigation is expensive to install, as the lines of tiles should be about 3 feet apart, or one line for each standard row. By connecting the tiles at one end by means of tiles across the rows, the water may be discharged into the tiles at one point from a hose and will find its way to all parts of the system, entering the soil through the openings.

For further information on irrigation, see Farmers' Bulletin 864, entitled "Practical Information for Beginners in Irrigation," or Department of Agriculture Bulletin 495, entitled "Spray Irrigation."

FALL AND WINTER CARE OF THE GARDEN.

In the autumn, after the crops have been removed, it is a wise plan to remove all vines, dead plants, and other trash and sow the ground to rye or some other green crop. This will prevent the earth from washing, and the green material will improve the physical condition of the soil. If this can not be done, it is well to plow or spade the garden and allow the ground to lie rough through the winter. This practice permits the frost to kill insects as well as to lighten the soil by alternate freezing and thawing. Many gardeners make a practice of plowing the ground and applying coarse manure, which decays and mixes with the soil during the winter. Well-rotted manure is best, applied to the rough freshly plowed ground so the leachings will be retained.

INSECTS AND DISEASES AFFECTING GARDEN CROPS.

In the control of insects and diseases that infest garden crops it is often possible to accomplish a great amount of good by careful management. In the autumn, after the crops have been harvested or as fast as any crop is disposed of, any refuse that remains, if it is diseased or infested with insects, should be gathered and burned. Several of the garden insects find protection during the winter under boards and any loose material that may remain in the garden. Dead vines or the leaves of plants are frequently covered with the spores of

diseases that affect those crops during the growing season, and these should be burned, as they possess very little fertilizing value.

This subject is treated in Farmers' Bulletin 856, entitled "Control of Diseases and Insect Enemies of the Home Vegetable Garden," to which reference is made for detailed suggestions for the control of insects and diseases affecting vegetables.

THE STORAGE OF SURPLUS VEGETABLES FROM THE GARDEN.

It is as important to properly store the surplus vegetables as to grow them. The successful storage of vegetables is not at all difficult; in fact, good storage facilities already exist in most homes, it being only necessary to make use of the cellar, the attic, a large closet, or some other part of the dwelling, depending upon the character of the product to be stored. A cool well-ventilated cellar under the dwelling offers good conditions for the storage of such vegetables as potatoes, carrots, beets, and other root crops. If such a cellar is not available it is often possible to store in banks or pits or in outdoor cellars. For information on the storage of vegetables, see Farmers' Bulletin 879, entitled "Home Storage of Vegetables."

CULTURAL HINTS FOR THE VARIOUS GARDEN CROPS.

ARTICHOKE, GLOBE.

Deep, rich sandy loam, with a liberal supply of well-rotted manure, is best suited for growing artichokes. Plant the seeds as soon as the soil is warm in the spring, and when the plants have formed three or four leaves they may be transplanted to rows 3 feet apart and 2 feet apart in the row. The plants do not produce until the second season, and in cold localities some form of covering will be necessary during the winter. This crop is not suited for cultivation north of the line of zero temperature.

After the bed is once established, the plants may be reset each year by using the side shoots from the base of the old plants. If not reset the bed will continue to produce for several years, but the burs will not be so large as from new plants. The bur, or flower bud, is the part used, and the burs should be gathered before the blossom part appears. If they are removed and no seed is allowed to form, the plants will continue to produce until the end of the season.

ARTICHOKE, JERUSALEM.

The Jerusalem artichoke will grow in any good garden soil, and should be planted 3 to 4 feet apart each way, with three or four small tubers in a hill. If large tubers are used for planting, they should be cut like Irish potatoes. Plant as soon as the ground becomes warm in the spring and cultivate as for corn. A pint of tubers cut to eyes

will plant about 30 hills. The tubers will be ready for use in October, but may remain in the ground and be dug at any time during the winter.

The tubers are prepared by boiling until soft, and are served with butter or creamed. They are also used for salads and pickles.

The Jerusalem artichoke is not of great importance as a garden vegetable, and the plant has a tendency to become a weed.

ASPARAGUS.

Asparagus should have a place in every home vegetable garden where it will thrive. This crop can be grown on almost any well-drained soil, but will do best on a deep, mellow sandy loam. There is little possibility of having the land too rich, and liberal applications of partly rotted barnyard manure should be made before the plants are set. The seeds of asparagus may be sown during the early spring in the rows where the plants are to remain and the seedlings thinned to stand 14 inches apart in the row at the end of the first season. It is usually more satisfactory to purchase 2-year-old roots from some seedsman or dealer. The price of good roots is generally about \$1.25 per hundred, and 100 to 200 plants will be found sufficient to supply the ordinary family. The roots should be transplanted during the late autumn or early spring.

Before setting out the plants, the land should be loosened very deeply, either by subsoil plowing or deep spading. It is a good plan to remove the topsoil and spade manure into the subsoil to a depth of 14 or 16 inches; then replace the topsoil and add more manure. There are two methods of setting an asparagus bed, depending entirely upon the kind of cultivation to be employed in the garden. If horse tools are to be used, the plants should be set in rows $3\frac{1}{2}$ feet apart and 14 inches apart in the row. On the other hand, if the garden space is limited, the plants should be set in a solid bed, 1 foot apart each way, and cultivated by hand. In setting asparagus, the crowns should be covered to a depth of 4 or 5 inches. It will be desirable to mulch the asparagus bed during the winter with 3 or 4 inches of loose manure or straw.

The part of the asparagus used as a vegetable is the young shoot that is thrown up during the early spring. The shoots are removed when about 4 or 5 inches in length by cutting slightly below the surface of the ground, but care should be taken that the knife is not thrust at an angle, or the crowns will be injured. If so desired, the shoots may be blanched by ridging up over the rows with loose sandy soil or by allowing the mulch to remain and the shoots to make their way through it; but unblanched asparagus always has a better flavor than blanched, is more easily produced, and is more satisfactory for home use. Too heavy mulching has a tendency to re-

tard the growth of the shoots by keeping the ground cold until late in the spring.

No shoots should be removed the first year the plants are set in the permanent bed, and the period of cutting should be short the second year. After the second year the plants become well established, and with proper fertilizing and care the bed will last indefinitely. During the cutting season all the shoots should be removed, as the roots will cease to throw up shoots as soon as one is allowed to mature. When the shoots become tough and stringy or are no longer desired for use, the cutting should cease and the tops should be allowed to grow during the summer. Late in the autumn, when the tops become dead, they can be removed and burned, the soil between the rows cultivated, and a fertilizer or mulch applied. For full information, see Farmers' Bulletin 829, entitled "Asparagus."

BEANS.

Beans will not withstand much cold, so they should not be planted until danger of frost is past and the ground begins to warm up. The first planting should be made as soon as the ground is reasonably warm, and other plantings may be made at intervals of ten days or two weeks until hot weather sets in. Beans for the fall garden should be planted in late summer, and successive plantings may be made at the intervals suggested until about eight weeks before the time for the first frost in the autumn.

Bush beans should be planted to stand 3 or 4 inches apart in rows 30 inches apart where horse cultivation is to be used. For hand cultivation, 20 to 24 inches between the rows will be satisfactory. Among the best varieties of bush beans are the Stringless Green Pod, Refugee, Hodson's Kidney Wax, Currie's Rustproof Wax, and Wardwell's Kidney Wax.

Lima beans, both pole and bush, should be grown in the garden. These should be planted after all danger of frost is over and the soil is warm. Plant the pole beans 8 to 10 seeds in a hill and thin to 3 or 4 after the plants become established. The hills should be 4 or 5 feet apart. Pole Lima beans may also be planted along the garden fence, allowing the vines to utilize the fence as a support. For bush Lima beans, plant 5 or 6 inches apart in rows 30 to 36 inches apart.

When planting beans of any kind the seed should not be covered over 2 inches, and on heavy soils they should not be covered more than $1\frac{1}{4}$ to $1\frac{1}{2}$ inches.

Seibert's Pole Lima, Carpinteria Lima, and King of the Limas are good varieties of pole Lima beans, and Landreth's Bush Lima, Dreer's Bush Lima, and Henderson's Bush Lima are good varieties of the bush type.

For further information on bean growing, read Farmers' Bulletin 289, entitled "Beans."

BEETS.

Beets can be planted as soon as danger of frost has passed, even before the ground has become warm. Sow the seeds in drills 14 to 18 inches apart, covering to the depth of about 1 inch. As soon as the plants are well up, thin them to stand 3 to 4 inches apart. Make two or three plantings, so as to have a continuous supply of young, tender beets throughout the season. In many sections of the South, beets may be left in the ground through the winter, to be pulled when wanted.

Varieties recommended: Crosby's Egyptian, Bassano, Early Eclipse, and Early Blood Turnip.

BORECOLE. SEE KALE.

BRUSSELS SPROUTS.

Brussels sprouts are closely related to cabbage and cauliflower, and may be grown in the same manner. Instead of a single head, Brussels sprouts form a large number of small heads in the axils of the leaves. As the heads begin to crowd, the leaves should be broken from the stem of the plant, to give them more room. (See fig. 15.) A few leaves should be left at the top of the stem, where the new heads are being formed. Brussels sprouts are more hardy than cabbage, and in mild climates may remain in the open ground all winter, the heads being removed as desired. For winter use in cold localities, take up plants that are well laden with heads and set them close together in a pit, coldframe, or cellar, with a little soil around the roots.

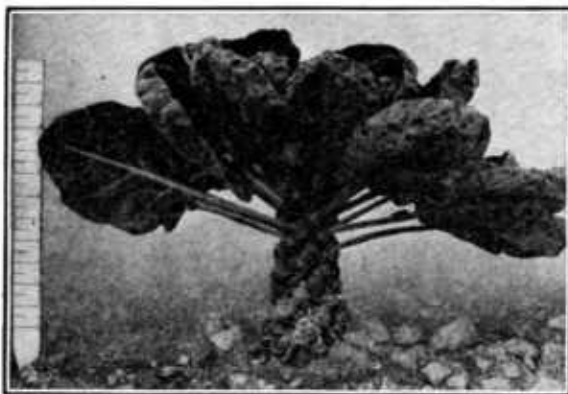


FIG. 15.—A single plant of Brussels sprouts. The immature heads are cut off and cooked like cabbage.

The uses of Brussels sprouts are similar to those of cabbage, but they are considered to be of a superior flavor.

BUR ARTICHOKES. SEE ARTICHOKES, GLOBE.

CABBAGE.

In some sections of zones D and E it is possible to set early cabbage plants in the

autumn. When this is done, the ground should be ridged and some protective covering given the plants during the winter. When set in the spring, the seed should be started in a hotbed or greenhouse in February and in the open ground as soon as the soil can be worked. For a late crop in the North, plant the seeds in a bed in the open ground in May or June and transplant to the garden in July. Early cabbages require a rich, warm soil in order that

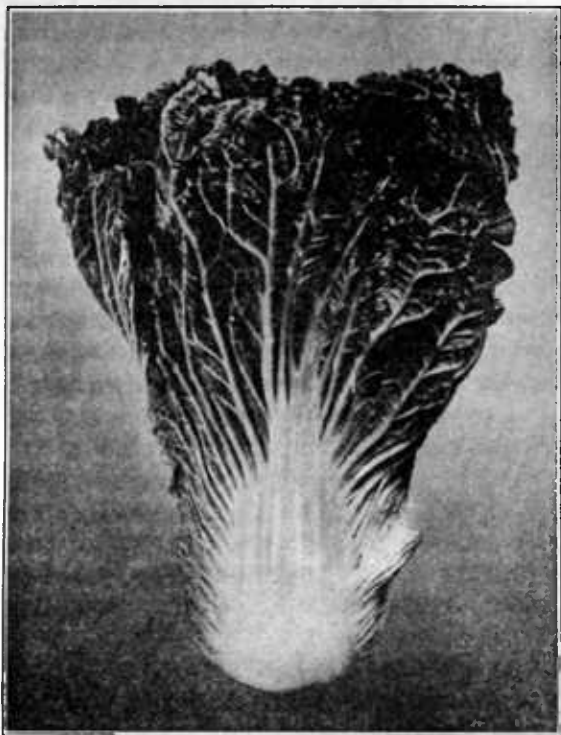


FIG. 16.—A trimmed head of Chinese cabbage ready for use.

they may mature early. For late cabbages, the soil should be heavier and more retentive of moisture and not so rich as for the early crop, as the heads are liable to burst. Cabbages should be set in rows 30 to 36 inches apart and 14 to 18 inches apart in the row. Early cabbages must be used soon after they have formed solid heads, as they will not keep during hot weather. They can, however, be used for making sauerkraut. For details as to the method of making and keeping summer kraut, see Farmers' Bulletin 881, entitled "Preservation of Vegetables by Fermentation and Salting." Late cabbage may be kept in storage cellars, banks or pits, or in trenches surrounded with poles, banked with dirt and covered over the top with straw. For detailed directions for the storage of cabbage, see Farmers' Bulletin No. 879, entitled "Home Storage of Vegetables."

CABBAGE, CHINESE.

Chinese cabbage is said by botanists to be very closely related to the turnip. It makes a head of erect leaves, which is stemless and rests on the ground. (Fig. 16.) It is often listed by seedsmen as Pai T'sai, or Petsay, which is a form of its Chinese name (Pe-tsai).

The plant may be used as a potherb, like kale or spinach, or when headed it is a fine salad plant, being more tender when cut up than ordinary cabbage.

It is difficult to get the Chinese cabbage to head in the spring, especially in the South, so that it is usable only as greens from the spring crop. For the fall crop it should be planted at the same time as fall turnips, as it matures in much less time than ordinary cabbage.

The plant demands very rich well-drained soil, but must not be allowed to suffer from lack of moisture. Seed should be started in a seed bed and the plants transplanted when they are quite small. They should be set not closer than 2 feet apart each way and will repay careful and continuous cultivation.

CANTALOUPE. SEE MELONS, MUSKMELON.

CARDOON.

The cardoon is a thistlelike plant, very similar in appearance to the Globe artichoke, but is grown as an annual. The seeds are sown in early spring in a hotbed or coldframe and the plants transplanted later to the open ground. The cardoon should be planted in rows 3 feet apart and 18 inches apart in the row on rich soil, where it can secure plenty of moisture and make rapid growth. Toward autumn the leaves are drawn together and the center blanched in the same manner as the endive. If intended for winter use, the leaves are not blanched in the garden, but the plants are lifted with considerable earth adhering to the roots and stored closely in a dark pit or cellar to blanch. The blanched leaf stems are used for making salads, soups, and stews.

CARROT.

The culture of the carrot is practically the same as the parsnip, except that carrots are not thinned so much and are allowed to grow almost as thickly as planted. Carrots should be dug in the autumn and stored, like parsnips or turnips. Any surplus can be fed sparingly to horses, mules, or cattle.

CAULIFLOWER.

Cauliflower requires a rich, moist soil, and thrives best under irrigation. It will not withstand as much frost as cabbage. The culture is the same as for cabbage until the heads begin to develop, after which the leaves may be tied together over the heads in order to exclude the light and keep the heads white. This point is brought out in figure 17.

CELERIAC.

Celeriac is a large-rooted form of celery used for cooking only. Cultivate the same as celery, but banking or blanching is not required. The roots may remain in the ground until wanted for use provided a light covering is applied to prevent freezing.

CELERY.

For the North, sow the seed in a hotbed or coldframe and transplant to the open ground. Celery plants are generally improved by transplanting twice. Celery seeds are very small and are slow in germinating, and the temperature of the seed bed should be kept low. The seed bed should be especially well prepared, and the seeds should not be covered to a greater depth than one-eighth of an inch. Watering should be attended to very carefully, and the bed should not dry out. After the plants are up, care should be taken that the bed does not become too wet and the plants damp-off. Five hundred plants will be sufficient for the ordinary family. They should be set 6 inches apart in rows 3 to 5 feet apart.

Celery requires a deep, rich, moist soil, with plenty of well-rotted barnyard manure or fertilizer and frequent shallow cultivations. In the garden, celery may be planted after some early crop, such as lettuce, radishes, peas, or beans. As soon as the plants attain con-



FIG. 17.—Cauliflower with the leaves tied up so that the heads will remain white.

siderable size, the leaves should be drawn up and a little soil compacted about their bases to hold them upright. If the blanching is done with earth, care should be taken that the hearts of the plants do not become filled. Boards, paper, draintiles, or anything that will exclude the light may be used for blanching, but earthing up will produce the finest flavor.

Celery may be kept for winter use by banking with earth and covering the tops with leaves or straw to keep it from freezing, or it may be dug and removed to a cellar, coldframe, vacant hotbed, or pit, and reset close together, with the roots bedded in earth. While in storage, celery should be kept as cool as possible without freezing.

The blanched stems of celery are eaten in the raw state, and both the stems and enlarged roots are stewed and creamed. Celery seed is used for flavoring soups and pickles.

CHERVIL.

Under the name of chervil two distinct plants, known as salad chervil and the turnip-rooted chervil, are cultivated. The seeds of the salad chervil are sown in spring, and the crop will thrive on any good garden soil. The seeds of the turnip-rooted chervil should be sown in the early autumn, but they will not germinate until the following spring.

The edible part of this plant is the root, which somewhat resembles the carrot and is used in the same manner. The leaves are used the same as parsely for garnishing and in flavoring soups.

CHARD.

Chard, or Swiss chard, is a beet which is grown for its foliage instead of its root. The leaves are cooked and used, in very much the same way as spinach, as a potherb or greens. The thickened leaf stem is sometimes cooked and used in very much the same way as asparagus. One of the good points about this vegetable is that crop after crop of leaves may be cut without injuring the plant.

Chard is planted about the same time and in the same manner as beets, but as the top grows larger it should be given more space than the garden beet. Figure 18 shows a typical plant of Swiss chard.

CHICORY.

Chicory is grown for two or three purposes. The root of this plant is the common adulterant of coffee, and large quantities are used for this purpose. The commercial growing of chicory is confined to a few sections, as the crop will not thrive on every kind of soil.

A deep, rich loam, without an excessive amount of clay or sand, is desirable, and soil that is not too rich in nitrogenous matter is best suited to the production of roots.

The roots of chicory are frequently placed in soil under a greenhouse bench or in a warm cellar and covered with a foot or more of straw or with a light covering of straw and then several inches of warm manure. Under this covering the leaves will be formed in a solid head, which is known on the market as witloof.

Chicory has run wild in some parts of the country and is considered a bad weed. The blue flowers of the chicory, which are borne the second season, are very attractive.

As a potherb, chicory is used like spinach, but the leaves should be boiled in two waters in order to remove the bitter taste. As a salad the roots are dug in the autumn and planted in cellars or under a greenhouse bench, where they produce an abundance of blanched leaves, which are eaten raw. The blanched leaves are also boiled and used as greens.

CHIVE.

Chive is a small onionlike plant having flat, hollow leaves which are used for flavoring soups. The chive rarely forms seeds, and it is propagated by the bulbs, which grow in clusters. The leaves may be cut freely and are soon replaced by others.



FIG. 18.—Swiss chard, a beet which has been bred for salad foliage instead of its root. The leaves and stalks may be cut repeatedly and used like spinach. Since the plant furnishes salad greens throughout the season, it may well be grown instead of spinach, which furnishes but one crop, or after spinach.

CIBOL. SEE ONION.

CITRON.

The citron is a type of watermelon with solid flesh which is used for preserves and sweet pickles. The rind of the watermelon is frequently substituted for citron. The cultivation of the citron is the same as for the watermelon.

CIVE. SEE CHIVE.

COLLARDS.

The culture and uses of collards are the same as for cabbage and kale. Collards withstand the heat better than either cabbage or kale and a type known as Georgia collards is highly esteemed in the Southern States. Collards do not form a true head, but instead a loose rosette of leaves, which, when blanched, are very tender and of delicate flavor.

CORN SALAD.

Corn salad is also known as lamb's-lettuce and fetticus. Sow the seed during the early spring in drills 14 to 18 inches apart and cultivate the same as for lettuce or mustard. For an extra-early crop, the seed may be planted during the autumn and the plants covered lightly during the winter. In the Southern States the covering will not be necessary and the plants will be ready for use during February and March. The leaves are frequently used in their natural green state, but they may be blanched by covering the rows with anything that will exclude the light.

Corn salad is used as a salad in place of lettuce or mixed with lettuce or water cress. The flavor of corn salad is very mild, and it is improved by mixing with some other salad plant for use. It is also boiled with mustard for greens.

CORN, SWEET.

Sweet corn should be planted on rich land and cultivated the same as field corn. Plant the seed as soon as the soil is warm in the spring, and makes successive plantings every two or three weeks until late summer. The same results can be obtained to some extent by planting early, medium, and late varieties. Plant the seeds about 2 inches deep in drills 3 feet apart and thin to a single stalk every 10 to 14 inches.

Sweet corn passes so quickly from the milk to the dough stage that care should be exercised to gather the crop just at the right time, in order to secure the most satisfactory results. The flavor of sweet corn depends upon its stage of maturity and the method of handling the product from the plant to the table. Sweet corn loses its sugar content very rapidly after being removed from the stalk. It should, therefore, be picked only a few hours, and preferably a few minutes, in advance of the time when it is to be placed in the pot.

Varieties recommended: For early corn. Golden Bantam and Adams Early are suggested, and for medium and late varieties Black

Mexican or White Mexican, Country Gentleman, and Stowell's Evergreen. The last named variety has the largest ears and is the most productive.

CRESS.

Under the name of cress there are two forms, the water cress and the upland cress. The upland cress, sometimes called peppergrass, is easily grown from seed sown in drills a foot apart. As the plants last but a short time, it will be necessary to make a sowing every few days if a continuous supply is desired.

Water cress can be grown all the year in small open ditches containing running spring water. It is best and most easily produced in water from rather warm springs in limestone regions. A sufficient supply for family use can be grown in a small spring-fed brook, and the plants may be started either from small pieces of plants or from seed. Cress is used in salads, to which it imparts a pleasant pungency.

CUCUMBERS.

The soil for cucumbers should be rich, and it is a good plan to apply well-rotted manure under the rows or hills. If planted in rows, open the furrow and scatter the manure along the furrow, turning fresh soil over the manure before planting the seeds. If the seeds are planted in hills, confine the application of manure to the area occupied by the hills.

As cucumbers are easily injured by cold, it is not advisable to plant until all danger of frost is over and the ground has begun to warm up. For very early cucumbers the seeds should be planted in a hotbed in old strawberry boxes, plant bands, inverted sods, or directly in the soil of the bed. By starting the plants in hotbeds the cucumbers will be ready for the table two or three weeks earlier than if started in the open. For the main crop, drill the seed in rows 5 feet apart and after the plants reach a height of 3 or 4 inches thin them to stand 12 to 18 inches apart in the row, or plant the seeds in hills 4 feet apart each way and thin to 3 or 4 plants to the hill.

Cucumbers should be given frequent shallow cultivation until the vines fill most of the space between the rows; after this, very little attention will be needed, except to pull out weeds by hand. Do not allow any fruit to ripen on the vines until the end of the picking season, as new fruits will not form while the older ones are ripening.

Young cucumber plants are often destroyed by the cucumber beetle. It is possible to protect the plants by covering them with small wooden frames over which mosquito netting has been stretched, or a square of mosquito netting dropped over a peg set in the middle of the hill, the edges of the netting being covered with earth to

prevent the netting from blowing off, may be used. Air-slaked lime sprinkled over the small plants is an added protection against the cucumber beetle.

The varieties recommended are White Spine, Davis Perfect, and Emerald.

For further information on cucumber growing, read Farmers' Bulletin 254, entitled "Cucumbers."

DANDELION.

Sow the seed of dandelion in spring in drills 18 inches apart, covering it one-half inch deep. Thin the plants to about 12 inches apart and give good clean cultivation throughout the summer. In the colder parts of the country it may be desirable to mulch slightly during the winter, to prevent the plants heaving out of the soil. Early the following spring the plants will be ready for use as greens, but they are greatly improved if blanched by setting two boards in the form of an inverted letter V over the row. The blanching not only makes the leaves more tender but destroys a part of the bitter taste. Dandelion greens should be boiled in two waters, to remove the bitterness.

EGGPLANT.

The plants for this crop should be started in a hotbed or in a box in the house about two months before time for planting in the field. The plants should not be set in the field until after all danger of frost



FIG. 19.—The eggplant when grown under good cultural conditions is a prolific yielder. All the fruits shown in the illustration are on a single plant.

has passed and the ground has become quite warm. Set the plants 18 to 24 inches apart in rows 3 feet apart and give clean, shallow cultivation in order to keep the plants growing rapidly. A dozen good, healthy plants will supply enough fruit for the average-sized family throughout the season. (Fig. 19.)

Eggplant may be used in several ways, one of which is the following: Peel and cut into slices one-fourth to one-half inch thick and soak in salt water for an hour; boil until tender; then coat with cracker crumbs or flour and fry in butter or fat. Another method is to steam or bake the eggplant whole, the pulp being eaten from the shell with salt, pepper, and butter.

Varieties recommended: New York Improved Purple, Black Beauty, and Florida High Bush.

ENDIVE.

The endive is a relative of chicory. Sow the seeds thinly in drills and when the plants are well established thin to 8 inches. Water and cultivate thoroughly in order that a good growth of leaves may be made. When the leaves are 6 to 8 inches in length, draw them together and tie them so the heart will blanch. The leaves should not be tied up while wet, or decay will follow. The heads should be used as soon as blanched. For winter use, sow the seeds rather late and remove the plants, with a ball of earth adhering to the roots, to a cellar or coldframe, and blanch during the winter as required for use.

Endive is used as a salad at times of the year when lettuce and similar crops are out of season.

FETTICUS. SEE CORN SALAD.

FLAG. SEE LEEK.

FRENCH ARTICHOKE. SEE ARTICHOKE, GLOBE.

GARLIC.

Garlic is closely allied to the onion, but will remain in the ground from one year to another if undisturbed. Garlic is planted by setting the small bulbs, or cloves, either in the autumn or early spring. The culture is practically the same as for the onion. The bulbs are used for flavoring purposes.

GERMAN CELERY. SEE CELERIAC.

GROUND-CHERRY. SEE PHYSALIS.

GUMBO. SEE OKRA.

HORSE-RADISH.

Horse-radish will thrive best in a deep, rich soil where there is plenty of moisture. The rows should be at least 3 feet apart and

the plants 12 to 18 inches apart in the row. Tops cut from large roots or pieces of small roots are used for planting. A comparatively few hills of horse-radish will be sufficient for family use, and the roots required for starting can be secured of seedsmen for 25 or 30 cents a dozen. This crop will require no particular cultivation except to keep down the weeds, and is inclined to become a weed itself if not controlled.

The large fleshy roots are prepared for use by peeling and grating. The grated flesh is treated with a little salt and vinegar and served as a relish with meats, oysters, etc. The roots should be dug during the winter or early spring before the leaves start. After being treated with salt and vinegar the grated root may be bottled for summer use.

HUSK-TOMATO. SEE *PHYSALIS*.

IRISH POTATO. SEE *POTATO*, IRISH.

JERUSALEM ARTICHOKE. SEE *ARTICHOKE*, JERUSALEM.

KALE, OR BORECOLE.

There are a large number of forms of kale, and these are thought by some to be the original type of the cabbage. Kale does not form a head, and has convoluted leaves and thick leaf stems. It may be set in rows and cultivated the same as cabbage or may be sown broadcast but set somewhat closer. This crop is very hardy and will live through the winter in the open ground in localities where freezing is not too severe. The flavor of kale is improved by frost.

Kale is used for greens during the winter and as a substitute for cabbage.

KOHL-RABI.

Kohl-rabi belongs to the same class as cabbage and cauliflower, but presents a marked variation from either. The edible portion consists



FIG. 20.—Kohl-rabi, showing the swollen stem, which grows above ground.

of the swollen stem of the plant, as shown in figure 20. For an early crop, plant and cultivate the same as for early cabbage. For a late crop or for all seasons in the South, the seed may be sown in drills where the crop is to be grown and thinned to about 8 inches apart in the row. The rows should be from

18 to 36 inches apart, according to the kind of cultivation employed. The fleshy stems should be used while they are young and quite tender.

LAMB'S-LETTUCE. SEE
CORN SALAD.

LEEK.

This plant belongs to the same class as the onion, but requires somewhat different treatment.

Leeks can be grown on

any good garden soil and are usually sown in a shallow trench. The plants should be thinned to stand about 4 inches apart in the row and the cultivation should be similar to that for onions. After the plants have attained almost full size, the earth is drawn around them to the height of 6 or 8 inches in order to blanch the fleshy stem. The leek does not form a true bulb like the onion, but the stem is uniformly thick throughout. Leeks are marketed in bunches, like young onions, and they may be stored the same as celery for winter.

Leeks are used for flavoring purposes and are boiled and served with a cream dressing, the same as young onions.



FIG. 21.—Head lettuce produces very tender, almost white leaves in the center of the heads, but is somewhat harder to grow than the loose-leaf sorts.

LETTUCE.

Lettuce attains its best development in a rich sandy loam in which there is plenty of organic matter. It thrives best during the early spring or late autumn and will not withstand the heat of summer. In order that the leaves may be crisp and tender, it is necessary to force the growth. The usual method of growing lettuce for home use is to sow the seeds broadcast in a bed and remove the leaves from the plants as rapidly as they become large enough for use. A much better method is either to thin or transplant the seedlings and allow the plants to form rather compact heads and then cut the entire plant for use.

The seeds may be sown in a hotbed or coldframe and the seedlings transplanted to the open ground, or the seeding may be in rows in the garden and the plants thinned to 5 or 6 inches in the row. Lettuce may be grown in rows about 12 inches apart. In order to produce crisp and tender lettuce (fig. 21) during the summer months, it may be necessary to provide some form of partial shading.

Varieties recommended: Grand Rapids and Black-Seeded Simpson for loose-leaf lettuce, and Big Boston, Hanson, and California Cream Butter for head lettuce.

MELONS.

Muskmelon.—The culture of the muskmelon is the same as for the cucumber except that the plants are usually given more space. Plant 8 to 10 seeds in a hill, spacing the hills 6 feet apart each way. After the plants become established, thin out all but four of the best ones. Another method is to sow in drills 6 feet apart and thin to single plants 18 to 24 inches apart.

Varieties recommended: Rocky Ford, Netted Gem, Emerald Gem, Eden Gem, Jenny Lind, and Paul Rose.

Watermelon.—The cultivation of the watermelon is the same as for the cucumber and muskmelon except that the plants require more space. Plant watermelon seed in rows 8 to 10 feet apart and thin to single plants 3 feet apart, or plant in hills 8 to 10 feet apart each way.

Varieties recommended: Kleckley Sweet, Florida Favorite, Georgia Rattlesnake, and Tom Watson.

MUSKMELON. SEE MELONS, MUSKMELON.

MUSTARD.

Almost any good soil will produce a crop of mustard. The basal leaves of mustard are used for greens, and as the plants require but a short time to reach the proper stage for use, frequent sowings should be made. Sow the seeds thickly in drills as early as possible in the spring, or for late use sow the seeds in September or October. The forms of white mustard, of which the leaves are often curled and frilled, are generally used. Mustard greens are cooked like spinach.

NEW ZEALAND SPINACH. SEE SPINACH, NEW ZEALAND.

OKRA, OR GUMBO.

Sow the seeds of okra in the open after the ground has become quite warm, or start the plants in berry boxes in a hotbed and transplant them to the garden after all danger of frost is past. The rows should be 4 feet apart for the dwarf sorts and 5 feet apart for the tall kinds, with the plants 2 feet apart in the row. Okra does best in rather rich land and requires frequent shallow cultivations until the plants cover the ground.

The young pods are the part used, and these are employed principally in soups, to which they impart a pleasant flavor and mucilaginous consistency. If the pods are removed from the plants and

none allowed to ripen, the plants will continue to produce pods until killed by frost, but the best pods are grown on young plants. Okra pods can be dried or canned for winter use.

For further information on okra, see Farmers' Bulletin 232, entitled "Okra: Its Culture and Uses."

ONIONS.

For very early bunch onions it is the common practice to plant sets in drills 12 to 14 inches apart and 2 to 3 inches apart in the row. The sets may be put out as early in the spring as the land can be prepared.

For dry onions, sow the seed thickly in drills about 12 to 14 inches apart in the spring, as soon as danger from hard frosts is over. For early bulbs the seed may be planted in a hotbed or coldframe and the young plants transplanted to the open when conditions are favorable. Plants 4 or 5 inches high are of good size for transplanting.

Onions require frequent shallow cultivations, and it may be necessary to resort to hand weeding. When the tops begin to die and the bulbs are full grown, the onions should be pulled and left in the field for a few days to dry. Then the tops should be clipped off and the bulbs placed in crates or bags and stored in a well-ventilated place to cure.

Early green onions may also be produced from the Multiplier or Potato varieties planted in the autumn. The large bulbs of these onions contain a number of "hearts," or buds, and if planted will produce a number of small onions. The small onions have but one "heart" and will produce large bulbs. A few large bulbs should be planted each year, to produce sets for fall planting.

The Top, or Tree, onion produces a number of bulblets on top of the stem. These small bulbs can be planted in the autumn and will produce onions the following spring.

Varieties recommended: Southport White Globe, Southport Red Globe, Danvers, Red Wethersfield, Australian Brown, and Prize Taker. In some sections of the South the Creole is grown, and the Louisiana, or Red Creole, is a popular variety. The Bermuda is a good type of mild-flavored onion and is desired by many. The important varieties of the Bermuda onion are Crystal Wax, White Bermuda, and Red Bermuda.

For additional information on onion growing, read Farmers' Bulletin 354, entitled "Onion Culture."

OYSTER PLANT. SEE SALSIFY.

PARSLEY.

After soaking the seeds of parsley for a few hours in warm water, they may be sown in the same manner as celery seed and the plants

transplanted to the open ground. At the North, parsley will live over winter in a coldframe or pit, and in the South it will thrive in the open ground during the winter; but it can not withstand the heat of summer. The plants should be set in rows 12 inches apart and every 4 inches in the row.

The leaves of parsley are used for garnishing meats and for flavoring soups.

PARSNIP.

Sow the seeds of parsnip as early as convenient in the spring in drills 18 inches to 3 feet apart. Thin the plants to stand 3 inches apart in the rows. The parsnip requires a rich soil and frequent cultivation. The roots can be dug late in the fall and stored in cellars or pits or allowed to remain where grown and dug as required for use. It is considered best to allow the roots to become frozen in the ground, as the freezing improves their flavor. As soon as the roots begin to grow the following spring, they will no longer be fit for use. All roots not used during the winter should be dug and removed from the garden, as they will produce seed the second season and become of a weedy nature. When the parsnip has been allowed to run wild the root is considered to be poisonous.

PEAS.

Garden peas, sometimes called English peas, are not injured by light frosts, so they should be planted as soon as the soil can be put in order in the spring. The first plantings should be of small-growing, quick-maturing varieties, such as the Alaska, First and Best, and



FIG. 22.—Tall-growing peas of the Telephone type, supported on brush.

Gradus, which do not require supports. These varieties should be followed by the large wrinkled type of peas, such as the Champion of England, Telephone, and Prize Taker. The large-growing varieties should be supported on brush, as shown in figure 22, on strings attached to stakes driven in the ground, or on wire netting. In order to have a continuous supply of peas, plantings should be made every ten days or two weeks until warm weather. Peas should be planted in late summer and autumn for the fall garden, for which the early varieties are more desirable than the late ones.

Peas should be planted about 10 seeds to the foot, 2 to 3 inches deep, in rows 3 to 4 feet apart. Some gardeners, however, follow the practice of planting in double rows 6 inches apart, with the ordinary space of 3 to 4 feet between these pairs of rows. This is a good practice with varieties requiring support, as the supports can be placed in the narrow space between the rows.

PEPPERS.

Seeds of peppers should be sown in a hotbed or in a box in the house about eight weeks before the time for settling the plants in the garden. The plants are tender and should not be transplanted until the ground is warm and all danger of frost is past. Set the plants 15 to 18 inches apart in rows $2\frac{1}{2}$ to 3 feet apart. The cultivation and treatment of peppers should be the same as for tomatoes and egg-plants. There are a large number of varieties of peppers, including the sweet kinds and the hot peppers.

Varieties recommended: Ruby King, Chinese Giant, Sweet Spanish, and Bell or Bull Nose, of the sweet peppers; Long Red Cayenne, Tabasco, and Red Cluster, of the hot types.

PEPPERGRASS. SEE CRESS.

PHYSALIS.

The physalis is also known as the ground-cherry or husk-tomato. Sow the seed in a hotbed or coldframe and transplant to the garden after danger of frost is past, or the seeds may be sown in the row where the plants are to remain and thinned to 12 or 18 inches. No particular care is required except to keep them free from weeds. There are a large number of varieties of physalis, and the fruits vary in size and color. The variety commonly used in gardens produces a bright-yellow fruit, which is about the size of an ordinary cherry. Toward fall the fruits will drop to the ground and will be protected for some time by their husks. If gathered and placed in a cool place the fruits will keep for a long time. The physalis will self-sow and may become a weed, but it is easily controlled. A few

of the volunteer plants may be lifted in the spring and placed in rows instead of making a special sowing of seed. Ten plants will produce all the husk-tomatoes desired by the average family. The fruits are excellent for making preserves and marmalade.

PIEPLANT. SEE RHUBARB.

POTATO, IRISH.

A rich, sandy loam is best suited to the production of Irish potatoes and the fertilizers employed should contain a high percentage of potash. The main crop of Irish potatoes for family use should be grown elsewhere, but a small area of early ones properly belongs in the home garden. The preparation of the soil should be the same as for general garden crops.

Early potatoes should be planted as soon in the spring as it is feasible to work the land, irrespective of locality. Late potatoes are extensively grown in the North, and the planting should be done late in May or during June. The rows should be not less than 2 feet apart and the hills 12 to 15 inches apart in the row. Lay off the rows with a 1-horse plow or lister and drop the seed, one or two pieces in a place, in the bottom of the furrow. Cover the seed to a depth of about 4 inches, using a hoe or a 1-horse plow for the purpose. One to three weeks will be required for the potatoes to come up, depending entirely upon the temperature of the soil. The ground may freeze slightly after the planting has been done, but so long as the frost does not reach the seed potatoes no harm will result, and growth will begin as soon as the soil becomes sufficiently warm.

As soon as the potatoes appear above ground and the rows can be followed, the surface soil should be well stirred by means of one of the harrow-toothed cultivators. Good cultivation should be maintained throughout the growing season, with occasional hand hoeing, if necessary, to keep the ground free from weeds. Toward the last the soil may be well worked up around the plants in order to hold them erect and protect the tubers from the sun after the vines begin to die.

After digging the potatoes, they should not be allowed to lie exposed to the sun or to any light while in storage, as they soon become green and unfit for table use. Early potatoes especially should not be stored in a damp place during the heated part of the summer and will keep best if covered with straw in a cool, shady shed until the autumn weather sets in, after which they can be placed in a dry cellar or buried in the open ground. The ideal temperature for keeping Irish potatoes is between 30° and 40° F., but they will not withstand any freezing.

POTATO, SWEET.

The sweet potato is of a tropical nature and succeeds best in the warm sandy loam soils of the Southern States. Sweet potatoes are, however, grown commercially as far north as the southern line of the State of Pennsylvania, and for family use even in southern New York and Michigan. A warm, loose sandy soil is best adapted to the production of sweet potatoes, and good drainage is essential. In order to improve the drainage conditions, it is customary to set the plants on top of ridges, which are thrown up by means of a plow, two furrows being turned together. For best results the soil should be well fertilized throughout, but in commercial sweet-potato culture the plan is frequently adopted of placing the fertilizer or manure in a furrow and then turning the ridge up over it. The manure should be evenly distributed, and it is advisable to run a cultivator once or twice in the furrow to mix the manure with the soil. Too much manure in one spot under the hill will produce a large growth of vine at the expense of the potatoes.

Toward the northern part of the area over which sweet potatoes are grown, it is necessary to start the plants in a hotbed in order that the length of season may be sufficient to mature the crop. The roots that are too small for marketing are used for seed, and these are bedded close together in the hotbed and covered with about 2 inches of sand or fine soil, such as leaf mold. The seed should be bedded about five or six weeks before it will be safe to set the plants in the open ground. Toward the last the hotbed should be ventilated very freely, in order to harden off the plants.

The ridges for planting sweet potatoes should be 3 to 5 feet apart and the plants about 14 inches apart in the row. Cultivate sufficiently to keep the surface soil loose and free from weeds, and the vines will soon cover the ground, after which no cultivation will be necessary.

Sweet potatoes are dug as soon as the vines are nipped by frost. They should be dug on a bright, drying day when the soil is not too wet. On a small scale they may be dug with a spading fork, and great care should be taken that the roots do not become bruised or injured in the process of handling. It is desirable that the roots should lie exposed for two or three hours in order to dry thoroughly, after which they may be placed in a warm, well-ventilated room to cure for several days. The proper temperature for curing sweet potatoes is from 80° to 90° F., and 50° to 55° F. afterwards. A small crop may be cured around the kitchen stove and later stored in a dry room where there will be no danger of their becoming too cold. Sweet potatoes should be handled as little as possible, especially after they have been cured.

Varieties recommended: Pumpkin Yam, Dooley, Nancy Hall, Triumph, and Southern Queen. Where a dry-fleshed potato is desired, the Improved Jersey, Big-Stem Jersey, and Triumph are recommended.

For further information on sweet potatoes, read Farmers' Bulletins 324 and 548, entitled "Sweet Potatoes" and "Storing and Marketing Sweet Potatoes," respectively.

PUMPKIN.

The true pumpkin is hardly to be considered a garden crop, and as a rule should be planted among the field corn. Plant where the hills of corn are missing and cultivate with the corn.

RADISH.

The radish is quite hardy and may be grown throughout the winter in hotbeds at the North and in coldframes in zone E. For the home garden the seed should be sown in the open ground as soon as the soil is moderately warm. Plant in drills 12 to 18 inches apart, and as soon as the plants are up thin them slightly in order to prevent crowding. Radishes require to be grown on a quick, rich soil, and some of the earlier sorts can be matured in two to three weeks after planting. If the radishes grow slowly they will have a pungent flavor and will not be fit for table use. For a constant supply successive plantings should be made every two weeks, as the roots lose their crispness and delicate flavor if allowed to remain long in the open ground. As a rule, a large percentage of radish seed will grow, and it is often possible by careful sowing to avoid the necessity of thinning, the first radishes being pulled as soon as they are of sufficient size for table use, thus making room for those that will mature later. Radishes will not endure hot weather and are suited only to early-spring and late-autumn planting.

There are a number of varieties of winter radishes, the seed of which may be planted the latter part of summer and the roots pulled and stored for winter use. These roots should remain in the ground as long as possible without frosting and should then be dug and stored the same as turnips. This type of radish will not compare with the earlier summer varieties, which may be easily grown in a hotbed or coldframe during the winter. An ounce of radish seed is sufficient to plant 100 feet of row, and when grown on a large scale 10 to 12 pounds of seed will be required to the acre.

RHUBARB.

The soil for rhubarb should be deep and there is little danger of having it too rich. Like asparagus, the seedling plants of rhubarb

can be grown and transplanted. Ten to twelve good hills are sufficient to produce all the rhubarb required by the average family, and the plants are most easily established by planting pieces of roots taken from another bed. Good roots may be secured from dealers and seedsmen at about \$1.50 a dozen. The old hills may be divided in the early spring or late fall by digging away the earth on one side and cutting the hill in two with a sharp spade, the part removed being used to establish a new hill.

The usual method of planting rhubarb is to set the plants in hills about 4 feet apart in a single row along the garden fence. If more than one row is planted, the hills should be $3\frac{1}{2}$ or 4 feet each way. The thick leaf stems are the part used, and none should be pulled from the plants the first year after setting. Rhubarb should receive the same treatment during winter as asparagus, and the plants should never be allowed to ripen seed. The roots may be brought into the greenhouse, pit, coldframe, or cellar during the winter and forced. Rhubarb does not thrive in warm climates.

The use of rhubarb is principally during the early spring for making pies and sauces, but the stems may be canned for winter use.

RUTABAGA.

The culture of the rutabaga is the same as for the turnip, except that the former requires more room and a longer season for its growth. The roots are quite hardy and will withstand considerable frost. The rutabaga is used like the turnip and also for stock feed. Two pounds of seed are required for one acre.

SALAD CHERVIL. SEE CHERVIL.

SALSIFY, OR VEGETABLE OYSTER.

Sow seeds of salsify during the spring in the same manner as for parsnips or carrots. An ounce of seed is required to plant 100 feet of row, and on a large scale 10 pounds to the acre. After the plants are well established they should be thinned sufficiently to prevent their crowding. The cultivation should be the same as for parsnips or carrots, and frequent use of a wheel hoe will avoid the necessity for hand weeding. Salsify may be dug in the autumn and stored or allowed to remain in the ground during the winter, as its treatment is the same as for parsnips. Salsify is a biennial, and if the roots are not dug before the second season they will throw up stems and produce seed. It is of a weedy nature and care should be taken that it does not run wild by seeding freely.

Salsify is deserving of more general cultivation, as it is one of the more desirable of the root crops for the garden. Its uses are similar

to those of the parsnip, and when boiled and afterwards coated with rolled crackers and fried in butter it has a decided oyster flavor, from which the name "vegetable oyster" is derived.

The Sandwich Island is the variety commonly grown.

SPINACH.

Spinach is one of the best crops grown for greens and should be found in every home garden. In the North it may be planted in early spring, or it can be planted in the autumn and carried over winter by mulching with straw or leaves. Sow the seeds of spinach in drills 1 foot apart at the rate of 1 ounce to 100 feet of row or 10 to 12 pounds to the acre. To produce good spinach, a rich loam which will give the plants a quick growth is required. As ordinarily grown, spinach occupies the land during the autumn and winter only and does not interfere with summer cultivation.

Spinach is an easily grown garden crop, and there is, perhaps, no other of its kind that will give as good satisfaction. Three or four ounces of seed planted in the autumn after a summer crop has been harvested from the land will produce an abundance of greens for the average family during the late autumn and early spring. In gathering spinach, the entire plant is removed and not the leaves. The larger plants are selected first, and the smaller or later ones are thus given room to develop. No thinning is required if this plan of harvesting is practiced.

The Savoy is the variety most commonly grown.

SPINACH, NEW ZEALAND.

The plant known as New Zealand spinach is not a true spinach but grows much larger and should be planted in rows 3 feet apart, with the plants 12 to 18 inches apart in the row. Some difficulty may be experienced in getting the seeds to germinate, and they should be soaked one or two hours in hot water before planting. New Zealand spinach is satisfactory for growing in warm climates, as it withstands heat better than the ordinary spinach. The fleshy leaves and tender stems are cooked the same as spinach.

SQUASH.

There are two types of squashes, the bush varieties and the running varieties. The bush varieties should be planted in hills 4 feet apart each way and the running varieties 8 to 10 feet apart each way. Squashes are prolific, and a supply for the average family will ordinarily be furnished by five or six hills of each sort. Squash seed should not be planted until danger of frost is over and the soil is

quite warm. The cultivation and care of squashes should be the same as for cucumbers or muskmelons.

The summer squash is prepared for the table in several ways. It may be boiled and eaten with butter, pepper, and salt, or it may be parboiled and then fried. It may also be sliced without boiling, soaked in water with a little salt, and then fried in egg and bread crumbs or cracker crumbs, like eggplant. Winter varieties are stewed or steamed, to be served with butter and salt, or are prepared in the same way for pie filling. They may also be baked and served in the shell, or the flesh may be scraped out after baking and served with butter and salt.

The varieties of summer squash commonly grown are the Pattypan, Summer Crookneck, and Vegetable Marrow. Of the winter squashes, the Delicious, Pike's Peak, and Hubbard are among the best.

SWEET CORN. SEE CORN, SWEET.

SWEET POTATO. SEE POTATO, SWEET.

TOMATO.

To insure an early crop of tomatoes the seed of a quick-maturing sort should be started about eight weeks before the time for setting the plants in the field. When only a few plants are needed, the seed may be sown in a shallow box in the house. For the best results in growing tomatoes the young plants should be transplanted as soon as they reach a height of $1\frac{1}{2}$ to 2 inches. Transplant these plants to



FIG. 23.—Tomatoes supported on a trellis made of stakes, wires, and string. Trained in this manner they may be counted on to make a maximum yield.

stand 2 inches apart each way in a hotbed, coldframe, or box in the house. When the plants begin to crowd, it is a good plan to transplant them to flower pots, plant bands, old strawberry boxes, or tin cans from which the bottoms and tops have been melted.

Tomato plants should be set in the open as soon as danger of frost has passed. If the plants are to be pruned to one or two stems and tied to stakes they should be set 18 inches apart in rows 3 feet apart. If the plants are not pruned or staked they may be planted 3 feet apart in rows 4 feet apart. It is advisable, however, to prune and train to stakes (fig. 23), especially for the early crop, as plants so treated will be healthier and more easily cultivated and will produce fruit which is earlier and more uniform in size and shape than that produced by plants which have not been trained and pruned. Soon after setting the plants in the field a stake should be driven near each plant, to which it may be tied. Care should be exercised to tie the plant so that it will not be injured by the string. A good plan is to loop the string around the stake and tie it under a leaf stem. Go over the patch once every week or 10 days and remove all shoots starting in the axils of the leaves.

Varieties recommended: For early tomatoes, Earliana or Chalk's Early Jewel is recommended, preferably the former. For medium and late varieties the following are suggested: Greater Baltimore, Red Rock, Globe, Beauty, Acme, and Stone. The Stone is usually preferred for canning.

For fuller information on tomato culture, see Farmers' Bulletin 220, entitled "Tomatoes."

TOP ONION. SEE ONIONS.

TREE ONION. SEE ONIONS.

TURNIP.

The turnip requires a rich soil and may be grown either as an early or a late crop. For an early crop sow the seeds in drills 12 to 18 inches apart as early in the spring as the condition of the soil will permit. Two pounds of seed are required to plant an acre. After the plants appear, thin to about 3 inches. The roots will be ready for use before hot weather. For late turnips the seeds are usually sown broadcast on land from which some early crop has been removed. Turnips are quite hardy and the roots need not be gathered until after several frosts. They may be stored in a cellar or buried in a pit outside. Before storing, the tops should be removed.

Turnips are used in pot-boiled preparations with potatoes, cabbage, and meat, are boiled with pork, or mashed like potatoes.

TURNIP-ROOTED CHERVIL. SEE CHERVIL.

VEGETABLE MARROW.

The so-called vegetable marrows are closely allied to the pumpkin, both as to species and habit of growth, the principal difference being that the vegetable marrows are used while quite young and tender and may be baked and served very much the same as sweet potatoes. They should receive thorough cultivation in order that a tender product may be secured and should be gathered while the outside skin is still so tender that it may easily be broken by the finger nail. The flesh is either boiled or mashed or baked in the oven and served with butter while hot.

VEGETABLE OYSTER. SEE SALSIFY.

WATER CRESS. SEE CRESS.

WATERMELON. SEE MELONS, WATERMELON.

WELSH ONION. SEE ONIONS.

WITLOOF. SEE CHICORY.

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